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BIENNIAL REPORT

Of the

HIGHWAY COMMISSIONER

State of

CONNECTICUT

FOR THE FISCAL YEARS ENDED JUNE 30, 1945 and JUNE 30, 1946

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SKETCH OF PROPOSED BRIDGE OVER THE CONNECTICUT RIVER, —
BETWEEN OLD LYME AND OLD SAYBROOK

BIENNIAL REPORT

of the

Highway Commissioner

to the

Governor

For the Fiscal Years Ended JUNE 30, 1945 *and* JUNE 30, 1946.

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FRED R. ZELLER,
Comptroller.

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Hartford, Conn.,
November 30, 1946

His Excellency,
Governor of the State of Connecticut,
Hartford, Connecticut.

Dear Sir:

I have the honor to transmit my report on the activities of the Highway Department for the fiscal years 1944-1945 and 1945-1946.

This report has been prepared in an effort to give to you, to the Legislators, and the people of the State a simple and understandable accounting of the ways in which the highway department is spending the money appropriated for highways, the results of the expenditure, the highway problems with which the State is faced, and related matters.

Since it is the last report which I shall have the honor of submitting to Your Excellency, I cannot refrain from expressing my sincere and great appreciation of your unfailing interest in highway matters and of your counsel and assistance in solving our problems. To have been a part of your administration of the state government has been both a pleasure and a privilege.

Respectfully yours,
William J. Cox,
State Highway Commissioner.

THE STATE HIGHWAY DEPARTMENT

Commissioner ..... William J. Cox
Deputy Commissioner ..... Arthur W. Bushell
Executive Deputy Commissioner ..... Charles F. Taylor
Secretary to the Commissioner ..... Julia D. Conway

Director of Engineering and Construction ..... Leslie G. Sumner
Soils Consultant ..... Philip H. Keene
Engineer of Location and Design ..... Daniel H. B. Starr
Engineer of Highway Design ..... Warren M. Creamer
Engineer of Contracts and Construction ..... Merwin A. Tyack
Engineer of Contracts ..... Elwood T. Nettleton
Engineer of Bridges and Structures ..... William G. Grove
Engineer of Bridge Design ..... John F. Willis

Director of Roadway Maintenance ..... Albert L. Donnelly
Engineer of Surface Maintenance ..... Harry C. Carsten
Engineer of Subsurface and Drainage ..... Homer R. Turner
Engineer of Highway Control ..... W. Howard Sharp

Director of Roadside Development ..... John L. Wright

Engineer of Rights of Way ..... Howard R. Manning (Deceased)
Edward F. Harris (Acting)
Engineer of Highway Boundaries ..... William Reynolds
Chief Title Examiner ..... Edward F. Harris
Supervisor of Right of Way Purchases .... Arthur H. Langley

State Aid Agent ..... William E. Hulse
Assistant State Aid Agent ..... Walter E. Gahan

Business Manager ..... Arthur M. Walters
Highway Chief Accountant ..... G. E. Okerfelt
Purchases Coordinator ..... O. G. Beyer
Superintendent of Property ..... J. E. Vehring

Director of Highway Planning Studies ..... Roy E. Jorgensen
Supervisor of Economic Studies ..... Curtis J. Hooper
Supervisor of Highway Planning Records ... Anthony Voska

Engineer of Materials ..... Raymond T. Healy

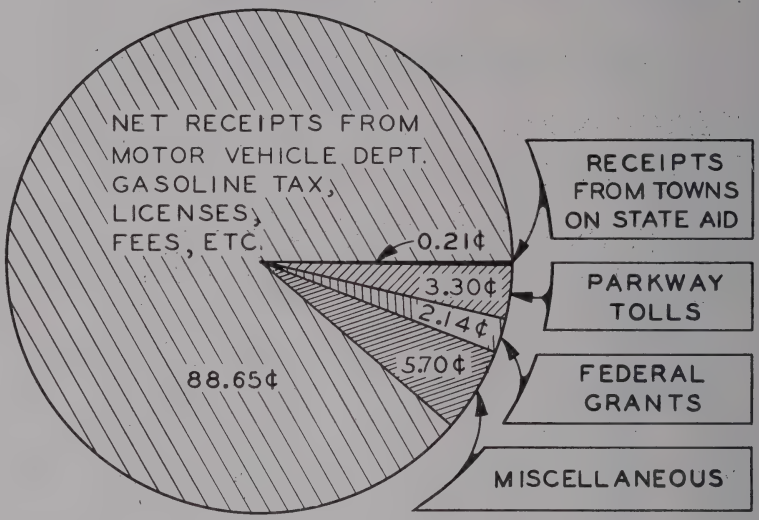
Audit Section ..... Nils A. Erickson

THE HIGHWAY DOLLAR

FOR THE BIENNIUM

SOURCE

FOR DETAIL SEE TABLE I



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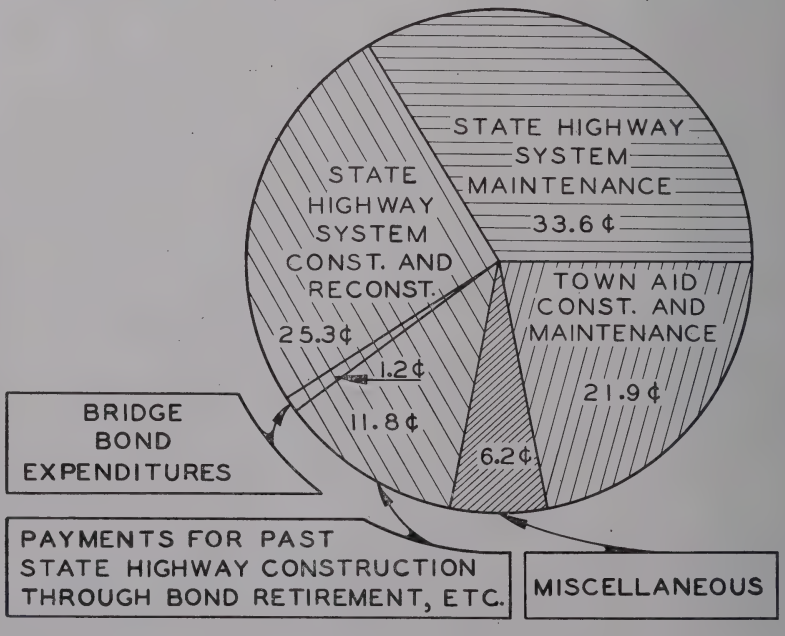


A SUMMARY OF THE BIENNIUM

The two years of the past biennium have coincided very nearly with the last year of actual warfare and the first of the post-war years. As a result, the work of the Highway Department during the biennium was divided quite definitely into two parts. A year of preparation for the resumption of normal highway activity was followed by a year of such resumption. During the first year of the biennium, highway construction was almost completely suspended. Highway maintenance was restricted to essentials. The care and development of highway roadsides was cut to the bone. Although the purchase of rights of way was continued, to permit a quick resumption of road building when the war should end, the determination and monumenting of highway boundaries was practically stopped, as was the field activity of the Connecticut Geodetic Survey. These departures from normal patterns of the department's work are strikingly revealed in the following employment figures:

	June 30, 1940	June 30, 1944
Bureau of Engineering and Construction (responsible for the design and construction of roads and bridges and the maintenance of bridges)	557	253
Bureau of Roadway Maintenance	1,022	850
Bureau of Roadside Development	722	209
Bureau of Highway Boundaries and Rights of Way	92	44

The employees on the payroll at the close of the war were largely key personnel, which made possible the prompt expansion of our forces to meet the broadening postwar program.

Activities of the Bureaus. The unit of the department the activities of which were probably least curtailed by the war is the Bureau of Highway Planning Studies. This bureau was not established until October 1, 1942. Since its establishment, and throughout the past biennium, it has been busily occupied along two very important lines of activity: (1) the formulation of a comprehensive program for an efficient and logical development of a suitable system of roads in the state and (2) the study of individual proposed improvements, in the light of present and prospective traffic needs. These latter studies seek to adapt the improvements as effectively as possible to the needs and to insure successful integration with past improvements and with other improvements to follow at still later dates. Both of these activities have been ably and successfully carried out by this bureau. Modern roads to serve the complex traffic needs of modern Connecticut, cost huge amounts of money per mile. To plan for the construction of such roads in logical sequence, in suitable locations, and with characteristics to serve traffic with maximum efficiency has necessitated the development of techniques and methods of highway planning

which were hardly in existence before the war and which are still in their infancy. To the development of these, the Connecticut Highway Department, in the past three or four years, probably has contributed as much as any other state.*

The annual state highway construction expenditure of the department increased steadily during the decade prior to the war, from seven million dollars in 1931 to fifteen million ten years later. Under stress of this increase, we were never able to accumulate a store of constructian plans to draw upon. Plans, when advertised, were usually "hot off the griddle", even to the point, sometimes, of being rushed in their details. This was an undesirable condition which, however, was very difficult of correction. The respite from construction which the war produced has been seized on and has enabled us largerly to correct this situation. On July 1, 1945, in anticipation of V-J day, the department had, ready to advertise, plans and specifications for $10,235,000 worth of improvements on the state highway system, besides 970,000 worth of town and state aid projects. In addition $11,060,000 of state highway projects and $1,320,000 of town and state aid projects were well advanced towards completion. As a result, the department was able to advertise $354,592.33 worth of construction less than a month after V-J day, and $14,910,819.95 worth of work was placed under contract within the year. Many of these projects were of unusual difficulty and will be of great importance and service to the State. With pride in the accomplishment of my colleagues in the department, I note that reconversion to beyond the pre-war rate of construction activity was accomplished well within a year and a minimum of confusion, delay and lost motion. On September 1, 1945, Mr. John Smith, Director of the Bureau of Engineering and Construction, retired after thirty-two years of devoted and valuable service to the state, being succeeded by Mr. Leslie G. Sumner. The transition caused no interruption in the bureau"s highly important activities.

The Bureau of Rights of Way, steadily perfecting techniques of land appraisal and purchase which were initiated by Your Excellency several years previously, was ready with the rights of way necessary to permit our construction program to go forward, and in addition has provided those which will be required for our construction needs a reasonable period ahead. The head of this bureau, Mr. Royal W. Thompson, resigned from the state service on May 10, 1945, to accept the post of Superintendent of Streets for the City of Hartford, after seventeen years of able and effective service to the state. He was succeeded by Mr. Howard W. Manning, whose untimely death on September 18, 1946, just after the close of the biennium, was a great loss to the department and to the state.

The Bureau of Materials Engineering, which conducts the laboratory research work of the department and which was given independent bureau status and an enlarged field of responsibility during the previous biennium, has also put to valuable use the time made

* Quoted from P. R. A. letter.

available to it through a decrease in the load of routine testing of construction materials. The problems of developing better, more durable road and bridge materials, of finding more successful means to combat the ravages of wear and weather, are as difficult as they are important. Confronted always with serious problems of maintaining an adequate laboratory and field personnel, the Engineer of Materials and his assistants have worked successfully towards the solution of many of these problems. At the same time they have diligently safeguarded the quality of materials purchased for the state and not merely by the highway department but by many other state agencies as well.

The Bureau of Roadway Maintenance had a tremendously important responsibility during the war years. No division of the department has had more difficulties to overcome during the biennium. It is to the credit of the entire personnel of the bureau that it has successfully overcome them. This bureau's program of minor road improvements at many scattered points throughout our mileages of older roads, which was carried on advantageously in years before the war, had to be curtailed during the biennium, for lack of equipment, materials and personnel. The roads themselves, thanks in part to the quality of their original construction, and in part to the quality of their maintenance came through the war period, we have reason to believe, in better shape than the roads of many states. In spite of abnormally severe winter conditions encountered in both years of the biennium, and in spite of our inability to replace trucks and other equipment which were really worn out and normally would have been retired long ago, the roads were kept open through each winter in a way that resulted in a steady stream of commendatory letters, both from residents of our own state and visitors from other states. This bureau over a number of years, through well planned and well executed operations, succeeded in steadily lowering the per mile cost of highway maintenance from $875 a mile in 1938 to just over $700 in 1942. Since then, large increases in rates of pay—the entering rate rose from 45 cents an hour in 1938 to 77 cents in 1946—the fair and proper action of the General Assembly in providing for time and a half pay for overtime work, and substantially increased costs of maintenance materials, reversed the trend of maintenance costs. The cost per mile rose to $1157 in 1944-45 and $1336 in 1945-46, and the total roadway maintenance expenditure for the biennium was $7,244,389.34. This was an increase of two and three-quarters million dollars over the 1940-1942 biennium. While due in some part to unusually severe winter conditions, it represents in large part what must probably be regarded as a continuing increase in maintenance costs. As such, it has serious implications for the construction program of the department.

The operations of the Bureau of Roadside Development were as much curtailed during the war as those of any bureau of the department. Only essential work has been done, and a substantial amount of deferred maintenance of trees and other roadside features has ac-

cumulated. Since our tree-climbers are young men, and since the war required young men, this bureau has been faced with particularly acute personnel difficulties. It has been notably energetic, resourceful and successful in the development of methods and equipment to reduce the unit costs of its operations, as set forth in some detail in previous reports, and this activity was successfully continued during the biennium.

The Bureau of State and Town Aid, has two principal functions. The first of these is to formulate agreements with appropriate town officials for the expenditure of the funds granted by the state to the towns for the improvement and maintenance of town roads and bridges. The second of these is to supervise the maintenance of town roads by town forces, and to audit and approve vouchers submitted by the towns for reimbursement for such expenditures.* Both of these activities continued throughout the biennium. The allocation of town aid funds continued as heretofore, necessitating the making of agreements for its immediate or eventual use. The maintenance of these roads was more difficult than ever before because of drastic shortages of labor, materials and equipment. It is testimony to able administration of most Connecticut towns and the Bureau of State and Town Aid as well that the town roads came through this trying period in such good shape and that they were constantly available for the transport of food stuffs and of workers in war industries all over the state.

Mention is made last of the Bureau of Business Administration, without the assistance of which none of the other bureaus of the department could have functioned. Whether it be the Division of Accounts, weighted by a growing burden of tax withholding and similar reports, or the Division of Property Control, trying to cure a shortage of automobiles and trucks so drastic as to threaten seriously our field activities, or a shortage of office space, hampering our Hartford office work, or a shortage of garage facilities which has become increasingly serious, the bureau has had many difficulties to contend with. These situations were all met and cared for, at least on an emergency basis where a permanent solution has been impossible.

The Audit Section has, as usual, performed its important regulatory functions quietly and efficiently, in the face of wartime difficulties which also complicated its operations, and the same has been true of the Personnel and Public Relations sections. The state has been extremely fortunate in having in the Highway Department, a capable, intelligent and conscientious personnel, in all the fields of engineering, maintenance, clerical, or administrative activity. It has been a satisfaction to me to have been associated with them, and I welcome this opportunity of commending their work to Your Excellency and of congratulating the state on the quality of its employees. I wish to record a particular debt of gratitude to the Deputy Highway

* The improvement of town roads, in conformity with agreements negotiated by the State Aid Agent, is usually a responsibility of the Bureau of Engineering and Construction.

Commissioner, Mr. A. W. Bushell, who has also carried the responsibility of Chief Engineer of the department, and the Executive Deputy, Mr. C. F. Taylor, and to my personal secretary Miss J. D. Conway.

More detailed accounts of the operations of the several units of the department are found later in this report.

Principal Events of the Biennium. Of all the happenings of the biennium, the one which probably, over the years, will have the greatest effect on Connecticut highways took place not in Connecticut but in Washington. This was a thoroughgoing revision of the basis for making grants of federal aid to the states. Heretofore federal funds have been apportioned to the states according to a mathematical formula adopted in 1921 when highway conditions and problems throughout the country were vastly different from what they are now. Conditions changed but the formula did not. In 1944, early in this biennium, Congress passed legislation authorizing the federal road grants for the three first post-war years. As a result of prolonged and determined efforts, in which Your Excellency, Congressman W. J. Miller of the First District, and the late Senator Francis Maloney all played important parts, fundamental changes were made in the Congressional highway act. As a result of these, Connecticut has received and will receive under the appropriation, six million dollars more than would have been our share under the old formula. Reasonable and equitable as these changes in distribution are, they encountered bitter opposition, which is now dormant rather than dead. The Congressional committees responsible for road legislation have generally been composed of senators and representatives largely unacquainted with the road problems of a state like Connecticut—one might perhaps say, largely unaware of their existence. If the justice which the state has won is not to be lost, vigilance and determination will have to be exercised in future years when road legislation is under consideration by Congress. The new pattern of federal aid distribution is not so firmly established that it cannot be forced back into the old mold.

Within the state, the most important highway happenings of the biennium have been the formulation of a comprehensive plan for highway improvement, with especial emphasis on a statewide expressway system; the actual planning and design of important rural and urban links in this system; the initiation of necessary underlying traffic studies to guide the design of other such links; the accumulation of an adequate "shelf" of highway and bridge designs to permit this construction to proceed in a planned and orderly fashion, at such rate as it can be financed; and the actual carrying out of a substantial amount of construction on this system.

Previous to this biennium, there has never existed a carefully thought out and comprehensive plan and program of highway improvements for the whole state. In the preceding biennium Your Excellency, in accordance with Special Act No. 456 of 1943, the passage of which I had requested, appointed a Highway Advisory Commission consisting of Honorable George E. Hinman of Willimantic

as chairman and Messrs. M. A. Connor of West Hartford, Kent T. Healy of New Haven, E. W. Latimer of Coventry and Benjamin H. Palmer of Norwich. This able and conscientious body, with assistance and information from the highway department, undertook a broad and thorough study of the state's highway needs, rural and urban, for a number of years ahead. Early in the present biennium the Commission completed and presented a very valuable report advocating a program of highway improvements. This plan has since guided the highway department's construction operations. Such a plan as this can never be fixed—frozen. It must remain fluid, be kept in constant tune with the state's travel needs as they change, or as they may be more clearly discerned. But such a plan is invaluable as an overall control of the highway department's activities, making it possible properly to develop and integrate them one with another and execute them in logical sequence. The Highway Advisory Commission's proposals, as modified by developments of the past two years, will shortly be laid before Your Excellency, the members of the next General Assembly and others in a separate publication, making it unnecessary to discuss them in detail here.

The 1945 General Assembly passed an act, (Sections 354h - 368h inclusive) creating the Old Lyme-Old Saybrook Bridge Commission and charging it with responsibility for determining the self-liquidating possibilities of a high-level, fixed toll bridge to replace the inadequate structure now carrying U. S. Route 1 over the Connecticut River; and furthermore providing that if feasibility of the project is established, the Commission should issue bonds and make suitable arrangements with the Highway Commissioner for the design and construction of the bridge. To this Commission Your Excellency appointed Hon. E. Lea Marsh, Jr. of Old Lyme; Hon. George E. Maynard of Old Saybrook; Hon. Northam L. Wright, and Judge Thomas Coulter of Essex, and Hon. Weston Pullen, Sr. of Lyme. Preliminary plans for the bridge and its approaches, and cost estimates, were prepared during the biennium by the Highway Department, working with the Commission, of which Mr. Marsh is Chairman, and with the Commission's consultants, Howard, Needles, Tammen & Bergendoff, of New York City and Kansas City. Traffic and financial studies have been made for the Commission by Coverdale & Colpitts, who performed a similar function for the Hartford-East Hartford Bridge Commission. These studies indicate that the cost of a suitable structure can be financed with a reasonable schedule of tolls. Congressional authorization for the bridge has been secured, as also a permit from the War Department, and at this writing it appears that construction of the bridge will be one of the major responsibilities of the department in the months and years immediately ahead. Supplementing this project, the department hopes to be able to include in its construction program for the coming biennium the improvement of a substantial mileage of the Post Road east of the Connecticut River and this should be followed at the earliest practicable date by corresponding improvements west of the river.

Within the highway department, the biennium has been marked by the re-writing of the book of "General Specifications" under which all highway construction by contractors is carried out, and by re-writing the operating manuals which establish the procedures for all activities carried on by highway department personnel. The General Specifications had not had so thorough and careful a revision in many years and the department's operating manuals in use at the beginning of the biennium had been written as long ago as 1931. Controls both for our internal operations and contract work are now believed to be as adequate and up-to-date as those of any highway department in the country.

Highway Problems Confronting the State. In my opinion, two major problems confront the state. They must be solved if Connecticut is to continue to have the highway facilities necessary to a healthy economy, and is to discontinue an unsound expenditure of highway funds which is inescapable under present statutes and which, if not corrected, will rapidly grow in seriousness. Each of these problems calls for legislative action. The first is the proper financing of the state highway system. The second is the proper financing, through state grants, of local roads. Because of their fundamental importance, these two problems will be outlined at some length.

For a number of years prior to the war, annual expenditures for improvement of the state highway system were at the average rate of about eleven million dollars a year. Of this amount, about seven million was provided from recurring state tax and fee revenues and federal grants; about four million dollars a year was borrowed. Since the war, state imposts have not risen to prewar levels, although it is probable that prewar levels will be reached and moderately exceeded within a year or two. However, also as previously noted, annual maintenance and other recurring highway costs rose during the war, and probably will never again drop back to prewar levels. In other words, the annual residual balance of tax and fee revenues available for construction will tend to be less rather than more than it was in prewar years if present revenue rates are not raised. That is point number one.

On the other hand, road and bridge construction costs are now at least 50 per cent above the prewar level, considering all types of highway construction. That is point number two.

In prewar years, our recurring income failed, by four million a year, to meet recognized highway construction needs, a fact demonstrated by the actual borrowing of nearly thirty million dollars and the expenditure of this sum, over a seven year period, on the Merritt Parkway and the Charter Oak, Middletown and New London bridges. This project, together with the proposed Old Lyme-Old Saybrook bridge on Route 1, largely exhaust the possibilities of toll financing in Connecticut. That is point number three.

To sum up the foregoing facts: merely to maintain the prewar rate of highway improvement will require at least sixteen million dol-

lars a year, less than half of which can be anticipated from federal aid and from recurring state revenues at present rates. Since we are rapidly reaching the end of projects susceptible of being paid for by tolls, the state highway improvement program will have to be cut back to less than half of what it was in prewar years unless additional revenues are provided.

On top of this, if the findings of the Highway Advisory Commission are to be accepted, the years ahead should see a *larger* annual construction program than the average program of prewar years.

The trunk line system, when it was established by the General Assembly in 1913, was not merely a system of rural roads. With unusual foresight, the Legislature appears to have recognized the illogic of omitting the most heavily traveled parts of a road network—the urban extensions of the main rural roads—from the state highway system; and it included them. The trunk line system extends right through our cities.

Our trunk line system consists of a network of roads which the state highway commissioner is authorized to improve, at his discretion. Once any road on this system has been improved with state funds, its ownership lies with the state and its maintenance is a state responsibility. No road placed on the trunk line system by the Legislature, however, becomes an obligation of the state until it has been improved with state funds.

When the trunk line system was created, traffic congestion was not a problem; mud and dust, ruts and potholes were. Even then, city streets were generally surfaced; rural roads were not. Consequently, the first problem of the highway department was to get all-weather surfaces on existing main trunk rural roads. To accomplish this required the next two decades or more.

At the end of that time—which was ten or twelve years ago—that first job was finished. The main rural roads were surfaced, as the city streets had earlier been. However, the twenty-thousand automobiles in the state in 1913 had mushroomed to twenty times that number, while horse-drawn vehicles had correspondingly decreased. It was no longer sufficient merely that a road be free from mud. Certain minimum standards of line, grade and cross-section had to be met, and much of the rural state highway system had to be rebuilt to higher standards. Much progress has been made, although many improvements remain to be made.

Over all these years, substantially all the activity of the department was expended on the rural part of the trunk line system, since it was inferior to the urban portion. However, with the steady improvement of the rural sections and with the growth in traffic volumes a change has occurred. The rural portion of the trunk line system, considered as a whole, has become much better suited to the traffic demands on it than the urban portion. From most points on the trunk line system, it is now possible to travel tolerably well to the edge of the nearest city; from there to the city's center, delays and difficulties multiply. Thousands of Connecticut people have the daily expe-

rience of requiring as much time to complete the last mile or two of a trip as the first ten miles have required. The problem of city traffic has become the most serious traffic problem in Connecticut. Thus while we have still to reconstruct some of the most important of our rural roads, and still to renew wornout surfaces and eliminate danger spots on other roads as in prewar years, we can no longer advisedly disregard urban traffic congestion.

As yet, we have barely tackled this problem. The Conland Boulevard and Whitehead Highway, bringing traffic to central Hartford over a modern road, constitute our only example, to date, of facilities to bring traffic safely and efficiently to our city business districts, although plans for such improvements in Waterbury, Middletown, Hartford, New Haven, Shelton and Derby are well advanced.

The report of the Highway Advisory Commission recognizes the fact that in addition to continuing the program of rural improvements which absorbed practically all of the prewar revenue, the state must also commence to meet its responsibilities for the urban portions of the trunk line system. If the highway department is to do this, at the rate recommended by the Commission, its construction funds in years ahead must be raised more than fifty-percent above the combined total of tax and bond issue construction revenues as those stood before the war.

The question to be decided is whether the state is to *have* an adequate road system; *not whether the state is to pay for one.* Thomas H. MacDonald, long-time federal Commissioner of Public Roads said, a great many years ago, "We pay the cost of good roads, whether we have them or not". That was true when the alternatives were the cost of hauling farm produce through the mud and the cost of the surfacing that would eliminate the mud. It is perhaps even more true when the alternatives of cost are a modern expressway system extending to the hearts of our cities, or the delays and dangers of imposing the traffic of more than half a million vehicles on archaic street systems laid out and built without the slightest concept of such a traffic.

The second major problem—that of the proper application of state grants to the financing of local road needs—is one that has been growing in seriousness for several years, and that in years ahead will very rapidly become more serious if proper corrective steps are not taken.

In 1931 the town aid act was passed "to get Connecticut out of the mud" by impoving and surfacing the town roads. The purpose of the act was understood to be to place every permanent rural dwelling (as distinct from summer camps, etc.) on a surfaced, all-weather road.

The original town aid act allotted $3,000,000 of highway funds to this purpose annually. For want of agreement as to a fair basis for dividing this amount among the 169 towns, the original allotment was made on an equal basis, all towns sharing alike, regardless of their size, populations, road mileages or road needs. Though the unfairness of this was recognized, it was argued that the road building job

to be done in each of the towns was so great that each town could, for a few years, make effective use of its equal allotment, and that within a few years, a new basis of distribution would be agreed to. This latter has never been done, however. On the contrary, another million dollars a year has been added to the town aid allotments, to be equally shared, as well as a fifth million which has been allotted on a basis proportional to the miles of unimproved roads in each of the towns.

Continuation, over a period of fifteen years, of the original illogical distribution of grants has produced extreme differences in the development of the road systems of the various towns. At one extreme, one town—which is fairly typical of a number of others—now has fourteen miles of improved roads, and just under five miles of roads that are unimproved. Only six families in the town continue to live on unimproved roads, *and the construction of only one-half mile of road would place all of these families on a hard road.* In other words, remaining essential construction in this town can be accomplished through the expenditure of a few thousand dollars, and thereafter all maintenance costs could reasonably be met out of something like $10,000 a year. Actually, however, this town has an accumulation of more than $100,000 of unspent road grant funds, and additional funds are being received at the rate of $25,000 a year.

At the other extreme, a certain town (which also is typical of a group) has 56 miles of improved roads to maintain, with *278 families* still living on unimproved roads. To serve these families, nearly fifty miles of road will have to be built, at a cost of some $600,000. Annual maintenance costs in this town far exceed the $24,000 a year which it receives from the state for such purposes; and the less than $200,000 of unspent funds accumulated during the war fall very far short of meeting this town's construction needs. Inequity of grant distribution over 15 years has exaggerated the initial differences in the local road conditions of the different towns until such differences have become truly fantastic.

The state still contains 3200 miles of unimproved "dirt" roads. But most of this mileage *leads nowhere in particular*, and the improvement of it cannot be justified on economic grounds—at any rate while 8,000 Connecticut families are still without the benefit of a hard road at their doors. We need only 1200 additional miles of road to put every all-year dwelling in Connecticut on a surfaced road. This is a goal that can quite easily be accomplished within a few years, if future town aid construction is restricted to these 1200 miles until they have been improved. Such restriction cannot be required, however, as the laws now stand, and without such a restriction, it is impossible to apportion the funds only to the roads justifying improvement—the roads on which these 8,000 families live.

The state grants used for *maintenance* of town roads need also to be reallocated in the interests of fairness and efficient expenditure. It is idle to seek a *perfect* basis for this allocation; human wisdom could not produce one. On the other hand, almost any change from

the present basis would be an improvement, and it should not be a difficult matter to work out an allotment that would be a vast improvement over the present one.

Administrative Problems Confronting the Department. As far back as Your Excellency's first term as governor, the highway department's allocation of space in the State Office Building became inadequate for the efficient and economical conduct of the department's work. The coming of the war and the consequent curtailment of the department's activities and decrease in personnel alleviated this situation temporarily; but the ending of the war brought back our personnel and necessitated a stepping up of our program while, at the same time, office space which had been relinquished during the war when we did not need it, could not be recovered. The result has been that through a large part of the biennium, and at the present time, our operations have been seriously embarrassed by lack of adequate working space. The state's purchase of the Flower Street building should correct this situation when that building becomes available, but in the meantime the department's activities are so hampered that every opportunity should be made to have the Flower Street building available for use at the earliest practicable date.

An even more serious situation exists with respect to garage facilities for housing our trucks and other equipment—which never has been very well housed. A building program to correct this situation was mapped a decade ago. The war, however, stopped this program soon after its inception and for the past five years, our garages, most of which are rented, have deteriorated and become steadily less adequate. Throughout the biennium the department has made continual efforts, which so far have been unsuccessful, to accomplish, through the Comptroller's office, the building of a number of garages at points on the highway system where they are urgently needed to give prompt attention to icy roads. The situation has become extremely critical, and gives rise to very substantial fears of traffic tie-ups and accidents in the winter ahead. It is devoutly to be hoped that the following winter will see the situation corrected, at least at its most critical points. Provision of proper facilities for housing our equipment, as well as more suitable working space for our men is, however, a problem that will require several years and substantial appropriations fully to correct. Events of the past biennium also point to a need of clarification and simplification of the statutes under which garages and field quarters for the highway department may be built.

The Legislature, in my opinion, might well give its serious consideration to a fundamental change affecting the highway department, namely, that the highway commissioner not be appointed directly by the Governor for a four-year term, but that he be appointed by a State Highway Board, which would be appointed by the Governor. The commissioner's appointment would be for an indefinite term. Members of the Highway Board would be appointed for four-year terms, only one member's term expiring in any biennium. This arrangement would be very comparable to that which exists with the Board of Edu-

cation and the Commissioner of Education. In my opinion, there would be two definite advantages in such an arrangement. In the first place, in the establishment of overall highway policies, the state would have the benefit of the breadth of background which a properly-chosen Board would have but which no one individual can hope to possess. In the second place, through such an arrangement, the state would be assured of a continuity of highway administration which is not a certainty under present statutes. The highway improvements which, to a steadily increasing degree, will be the principal concern of the highway department are major undertakings which cannot be conceived and executed within the four-year term which is the maximum definite expectancy of tenure which a highway commissioner can have at present. It is true that in this state there have not been the frequent changes in highway administration that have so complicated the effective operation of highway departments in some states. Nevertheless, the greater assurance of continuity in highway policies would be of benefit to the state.

It may be objected that the highway department, during its first two years of existence, from 1895 to 1897, was administered by a three-man commission, and that the system proved unsatisfactory. The weakness of the original plan, however, was that it confused policy-making and executive functions, placing both in the hands of the same three men. For success, there must be a clear line of demarcation between functions. The Board should not engage directly in the administration of the department, controlling this only through its power to appoint and remove the commissioner. This question, basic as it is to the administration of the highway department might well receive careful consideration.

NECROLOGY

Between the date of compilation of the preceding biennial report and July 1, 1946, death claimed the forty-one members of the department who are listed here. Three of these were serving with the armed forces of the United States and met death as a result of enemy action. Sixteen were retired members of the department.

Name	*Title*	*Unit*	*Date*
John Agogliati	Caretaker	20	9-15-44
John Anderson	Highway Foreman	201	9-24-44
Joseph Bazinet	Highway Maintainer, Gr. 2	203	2-10-46
William H. Bergmann	Highway Maintainer, Gr. 1	201	6- 9-44
George Besozzi	Junior Highway Engineer	46	5- 1-46
Reuben J. Brutton	Highway Maintainer, Gr. 1	206	8-15-45
Bruno Brokelschen	Store Supervisor	17	11-13-45
John R. Calvenese	Photo Equipment Operator	29	7-27-45
J. William Cross	Senior Highway Engineer	65	1-29-45
John D'Andrea	Highway Maintainer, Gr. 1	54	9- 4-45
Harold Eagling	Highway Maintainer, Gr. 1	205	1- 1-46
Henry Fassett	Highway Maintainer, Gr. 2	206	2- 8-46
John Gagliardi	Highway Maintainer, Gr. 1	205	12-11-44
Mariano Gervasi	Highway Maintainer, Gr. 1	201	6- 3-45
Samuel B. Gesner	Drawbridge Operator	66	1- 5-46
Peter Gibney	Highway Maintainer, Gr. 1	202	10-14-44
Samuel Graham	Highway Maintainer, Gr. 2	204	2-19-46
George E. Hamlin	Dep. High. Comm. for Mnt.	Mnt.	6- 4-46
William D. Healey	Highway Foreman	201	3- 5-46
Arthur Henrechon	Highway Maintainer, Gr. 3	205	12-14-44
Charles J. Hruskovic	Highway Maintainer, Gr. 2	54	4-25-45
Joseph King	Highway Maintainer, Gr. 1	204	6-16-46
Daniel Linehan	Senior Highway Engineer	72	5-17-45
John Linehan	Highway Maintainer, Gr. 3	27	6- 7-45
Charles R. Machalowski	Highway Maintainer, Gr. 2	54	12-10-45
Dwight F. Manghue	Highway Maintainer, Gr. 1	52	4-30-45
Joseph Mariano	Highway Maintainer, Gr. 2	201	9- 1-45
William F. Martin	Inspector Foreman	96	3-25-46
Paul Messer	Assistant Foreman	66	3-19-45
Andrew Nelson	Caretaker	27	6-16-46
Herbert Owen	Senior Engineering Aid	44	10-10-45
Clarence E. Palmer	Highway Foreman	206	2- 9-46
Martha L. Riley	Clerk, Gr. 2	26	12- 1-44
Paul Schilcher	Highway Maintainer, Gr. 1	201	5-24-46
Dewey Schramm	Highway Maintainer, Gr. 2	203	11-28-44
George E. Smith	Associate Highway Engineer	70	9-14-44
Daniel Taylor	Ferry Captain	66	6-26-46
Cuono Trotto	Highway Maintainer, Gr. 1	203	2-16-46
Stanley Wasielewski	Highway Maintainer, Gr. 1	52	3-20-45
Willis L. White	Highway Maintainer, Gr. 3	20	12- 3-45
Creslow Zguzenski	Highway Maintainer, Gr. 2	201	3-27-45

RETIREMENT OF PERSONNEL

In accordance with the terms of the State Retirement Law sixty-two members of the department have retired since the publication of the last list. Of this group thirteen retired on the basis of long service (twenty-five or more years), twenty-two for disability (largely with more than fifteen years service each) and twenty-seven retirements were mandatory, caused by attainment of age seventy for men and age sixty-five for women.

Name	*Title*	*Location*	*Date Retired*
Ralph Andrews	Highway Foreman	District 6	May 1, 1946
Eugene Barsalou	Hwy. Maint. Gr. 1	District 6	Mar. 1, 1945
Forrest C. Bennett	Drawbridge Operator	Bridges	Feb. 23, 1946
George Bridges	Hwy. Maint. Gr. 1	District 6	Nov. 1, 1945
Thomas H. Canfield	Hwy. Maint. Gr. 1	District 5	Dec. 1, 1945
Benjamin H. Chalker	Sr. Drawbridge Oper.	Bridges	Mar. 1, 1946
Walter Chandler	Hwy. Maint. Gr. 1	District 6	Dec. 1, 1945
Patrick Collins	Highway Foreman	District 5	April 1, 1946
W. W. Couser	Hwy. Maint. Gr. 1	District 5	Nov. 28, 1945
James Craig	Senior Hwy. Engineer	Hartford	Aug. 1, 1945
George W. Dean	Rt. of Way Purchaser	Hartford	Mar. 1, 1946
William Dupell	Hwy. Maint. Gr. 1	District 1	June 11, 1945
Harry Fanton	Hwy. Maint. Gr. 1	Roadside 51	Mar. 1, 1946
Andrew Fazzone	Hwy. Maint. Gr. 1	District 1	April 18, 1946
Arthur Fengolio	Senior Hwy. Engineer	Hartford	June 21, 1946
John L. Foley	Off. Appliance Sup.	Hartford	June 1, 1946
John Franconi	Hwy. Maint. Gr. 2	Roadside 52	Mar. 17, 1946
H. D. Ganong	Hwy. Maint. Gr. 2	District 1	April 27, 1946
John Gall	Hwy. Maint. Gr. 1	District 6	Jan. 1, 1945
John Giza	Hwy. Maint. Gr. 1	District 2	Dec. 1, 1945
Austin B. Goodyear	Jr. Hwy. Engineer	Right of Way	Feb. 16, 1946
Edward W. Gould	Hwy. Maint. Gr. 1	District 1	Mar. 21, 1946
Samuel Graham	Hwy. Maint. Gr. 2	District 4	Aug. 1, 1945
B. B. Green	Maint. Dist. Supervisor	District 5	Mar. 1,1946
Reinhold Hacker	Hwy. Maint. Gr. 1	District 5	Sept. 1, 1944
N. W. Hardenbergh	Maint. Dist. Supervisor	District 4	June 20, 1946
Joseph Ippi	Hwy. Maint. Gr. 1	District 2	Feb. 1, 1945
Herman Kirk	Hwy. Maint. Gr. 1	District 1	Sept. 14, 1944
Frank Laby	Hwy. Maint. Gr. 2	District 5	April 1, 1946
Henry Lange	Hwy. Maint. Gr. 1	Roadside 54	Mar. 1, 1946
Joseph Leroux	Highway Foreman	District 6	Oct. 1, 1945
Daniel J. Linehan	Sr. Hwy. Engineer	New Haven	May 1, 1945
A. T. Main	Hwy. Maint. Gr. 1	District 3	June 7, 1946
Nazzereno Marcolini	Hwy. Maint. Gr. 2	District 2	Sept. 1, 1945
Angelo Mauro	Hwy. Maint. Gr. 1	District 2	Sept. 23, 1944
John McHugh	Hwy. Maint. Gr. 1	District 5	Dec. 1, 1944
Frank Muoio	Hwy. Maint. Gr. 2	District 1	April 1, 1946
Andrew Nelson	Watchman	Portland Plant	Mar. 1, 1946
Joseph Nucci	Hwy. Maint. Gr. 1	District 2	Oct. 1, 1945
Arthur G. Nye	Highway Foreman	District 6	Oct. 1, 1945
Michael O'Neil	Hwy. Maint. Gr. 1	District 4	Mar. 1, 1946
Leon W. Parker	Highway Foreman	District 6	April 1, 1945
Thomas Parker	Hwy. Maint. Gr. 1	Roadside 54	Nov. 14, 1945
Winchester Peck	Hwy. Maint. Gr. 1	District 2	Oct. 1, 1945
John Piccirillo	Hwy. Maint. Gr. 2	District 1	July 13, 1945
William J. Reel	Highway Foreman	District 4	Aug. 16, 1945
Donato Ruggiero	Highway Foreman	District 5	July 1, 1944
Robert Sawyer	Hwy. Maint. Gr. 1	District 2	Dec. 1, 1944
William Schlicher	Hwy. Maint. Gr. 2	Roadside 52	Mar. 22, 1946
William O. Seyms	Hwy. Maint. Gr. 1	District 3	Nov. 1, 1944
Robert H. Shirah	Hwy. Maint. Gr. 2	District 5	Mar. 1, 1944
Alec Sindak	Hwy. Maint. Gr. 1	District 5	Sept. 1, 1945
John H. Smith	Director Eng. & Constr.	Hartford	Sept. 1, 1945
Harry Stratton	Hwy. Maint. Gr. 1	Roadside 53	Nov. 1, 1945
James F. Sullivan	Laboratory Assistant	Portland	Mar. 1, 1946
Cecil Trowbridge	Sr. Hwy. Engineer	New Haven	Mar. 1, 1946
Frank Varni	Hwy. Maint. Gr. 1	District 5	April 18, 1946
Andrew Wayland	Hwy. Maint. Gr. 1	Roadside 52	Sept. 1, 1945
John Weis	Hwy. Maint. Gr. 2	Property Control	Mar. 15, 1946
Fred M. Williams	Drawbridge Operator	Bridges	Feb. 23, 1946
Patrick J. Winters	Hwy. Maint. Gr. 1	District 4	Mar. 1, 1946
Charles C. Wittney	Hwy. Maint. Gr. 1	District 5	May 1, 1945

WAR SERVICE

Since the last (1943-1944) Biennial Report, 13 additional members of the department are recorded as having entered the armed forces of World War II. The total now stands at 497.

Five additional men made the supreme sacrifice bringing the total to 14. The five are listed herewith.

Staff Sergeant John R. Calvanese, a member of the Blue Print Room, was killed in action over Central Europe, July 27, 1944.

Private John Brndiar, a member of District Six of the Bureau of Roadway Maintenance, was killed in action in the European area, August 24, 1944.

Private Creslow Zguzenski, a member of the State and Town Aid Bureau, was killed in action during the Battle of the Bulge, January 9, 1945.

Sergeant Charles Kirchofer, a member of District Four of the Bureau of Roadway Maintenance, was killed in action in Germany, May 6, 1945.

Sergeant Dwight F. Manghue, a member of the Bureau of Roadside Development, was killed in action on Okinawa, April 30, 1945.

Since October 18, 1944, the date covered by the last biennial report, the following members of the department left for war service. The listing ends with V-J Day.

Name	Military Leave Date
Angelo A. Chipello	April 25, 1946
Constantino DeBone	March 8, 1945
Edward F. Draghi	December 15, 1944
William A. Ferber	April 7, 1945
Newell E. Gaulin	May 16, 1945
Frank E. Goodale, Jr.	December 18, 1944
Noel J. Marti	December 21, 1944
William K. Osgood	June 8, 1945
Frank J. Poglitsch	June 15, 1945
Harold A. Seymour	July 24, 1945
Nicholas M. Tompkins	July 27, 1945
Robert C. Tracy	March 21, 1945
Marvin L. Wilson	January 18, 1945

DEPUTY HIGHWAY COMMISSIONER

By ARTHUR W. BUSHELL

This biennium has been one in which the activities of the department as a whole underwent rapid changes due to the progress of the war. It started off in a period of decreasing activity, which practically amounted to discontinuance of construction due to the increasing restrictions imposed by the war effort and the constant drain upon the personnel of the department. As the war ended there was a rapid and complete reversal in every respect. Restrictions were withdrawn and the tempo of the department was immediately stepped up.

Manuals giving directions for the operation of each bureau of the department were compiled and coordinated with the activities of all the other bureaus. These were issued to the members of the department and are now in use to guide them in the work of correctly carrying out the various functions of each bureau. The department as a whole has shown the results of the various reorganizations effected during the last biennium, and when a demand for concerted action developed at the close of the war, the department was able to respond with efficient inter-bureau cooperation. The return to the full pre-war effectiveness has been hampered considerably by lack of floor space and by inability to obtain new automobiles to replace those worn out by constant service during the war. While personnel has been returning to the department since the end of the war, we are still far short of the number necessary for full operation and we are still working with only approximately 80 per cent of our pre-war personnel.

Fortunately, we were quite ready for the full resumption of activities. During the preceding biennium the Bureau of Engineering and Construction had completed plans for construction amounting to $5,800,000.00, based upon our engineers' estimate of the possible construction costs; and by the time construction restraints were removed, there were complete and ready for advertising, plans calling for construction amounting to approximately $9,000,000. There were also completely designed, but not ready to advertise, other projects valued at approximately another $12,000,000. The projects in this latter group were in condition so that they could be completed as rapidly as needed for advertising. In addition, there was a backlog of projects in various stages of completion amounting to approximately $18,000,000.

As this biennium ends, after maintaining a schedule of lettings averaging over $1,000,000 per month, we have projects complete and ready to advertise amounting to approximately $11,000,000; with the second group, complete but not ready for advertising, amounting to approximately $4,000,000; and the third group, or backlog of incomplete projects, amounting to approximately $19,000,000.

The Standard Specifications for Roads, Bridges and Incidental Construction, was revised completely, and published in mimeographed

form for immediate use. These specifications are still in the process of revision as the need arises, and it is planned to have them printed as soon as possible.

The personnel of the Bureau of Engineering and Construction has been increasing steadily due to the return of men from the Seabees, Army Engineers, and other branches of the Armed Forces; but we are still in need of additional men to handle the work of the bureau.

The Bureau of Roadway Maintenance has continued to maintain the roads in excellent condition and, with the end of restrictions, has begun improvement of some roads with betterment projects that had been held in abeyance during the war.

The Bureau of Roadside Development, whose activities were severely curtailed during the war, has been able to maintain the roadsides in a satisfactory manner. While not up to full strength as yet, it is starting to regain some of the field forces lost during the war, and is gradually resuming the landscape development work on new highways and parkways.

The Bureau of Highway Boundaries and Rights of Way has kept pace with the planning of the Bureau of Engineering and Construction by the purchase of rights of way for the huge post-war program. With the cessation of the war it has again resumed in a limited way the boundary surveys that had been postponed until the personnel was available.

The comparatively new Bureau of Materials Engineering, formerly the Highway Department Laboratory, operated under severe handicaps due to lack of personnel. With the end of the war, the increase in the calls for the services of the bureau was not offset by a corresponding increase in personnal. This has now been overcome, and the experimental and research work on various highway problems is continuing in conjunction with the regular and diverse activities in sampling and testing of materials and investigation of soils.

The Bureau of Business Administration has shown the least change due to the removal of restrictions as the war ended. This bureau's work of obtaining needed supplies, materials and services for the rest of the department, has met with better results and success since then. Some remarkable feats of substitution, improvisation and repair were performed because of inability to acquire new equipment or desired specific materials. By this means the work of the entire department continued to function throughout this difficult period.

As a result of our successful experience during the war, a new section has been established in this bureau, known as the machine shop. This machine shop will take care of fitting all equipment with the standard and special maintenance accessories necessary for our work, safety devices, etc. Experimental work in developing new equipment and accessories for specific use, which heretofore has been done either at outside garages or machine shops, will be done at this shop.

The Bureau of Highway Planning Studies has been carrying on its work of planning the need for future major traffic arteries, obtain-

ing and analyzing information relative to traffic movements, and other details incident to these future projects.

The Bureau of State Aid and Town Aid continued to make agreements throughout the biennium with the Town officials for the improvement and maintenance of town roads by the expenditure of Town Aid and Unimproved Road Funds. Many of the agreements for construction, however, have not as yet been carried out due to the high prices bid for this work. Maintenance work has been carried on with town forces under supervision of this bureau.

The department has at last been able to complete the unfinished work on the approaches to the Hartford-East Hartford Bridge and the Groton-New London Bridge, which had been held up by the war, except for the permanent lighting. This will be completed as soon as materials "on order" throughout the war are delivered. There are property matters that we have been unable to get before the Courts for settlement.

The Old Lyme-Old Saybrook Bridge Project is rapidly taking shape and the department is working closely with the Bridge Commission in preparing plans, obtaining War Department approval and, in general, preparing for the immediate construction of this bridge and approaches.

In short, during this biennium the various bureaus have carried on the routine work of the department and now are in a period of expansion of personnel actively engaged in catching up with the construction of new roads and the maintenance of old roads, deferred because of war activities.

EXECUTIVE DEPUTY COMMISSIONER'S BUREAU

By CHARLES F. TAYLOR, *Executive Deputy Commissioner*

General. The biennium just closed covers both wartime and reconversion periods. A review of our activities shows the impact of both, not only on the quality and quantity of available personnel, but on many other phases of our work as well.

Generally speaking, the restrictions imposed by wartime conditions, kept non-essential operations at an absolute minimum. This resulted in our getting along with a minimum of personnel, with almost no replacements for those leaving to enter war industry, military service, or private enterprise.

Reconversion found us with needs for expansion, due to large back logs of accumulated maintenance and construction projects, in a labor market almost devoid of adequate help, and with that help not much interested in available pay schedules.

As a net result we have been generally undermanned, with all heads clamoring for merely a normal number of workers. Turnover has been heavy and continuous. Notwithstanding these drawbacks, progress in planning and execution, has been noteworthy.

The part assigned to this bureau is briefly discussed below:

Personnel Administration. Continuing studies have been made either to bring into line some outstanding examples of inequities in duties or salaries, or, as in the case of the engineering series, to revise the specifications in accord with modern needs, and bring the steps and salary ranges into a logical series of ascending values.

Revision of this nature was done in the bureaus of Roadside Development, Materials Engineering, and Engineering and Construction.

Many examinations were held by the Personnel Department on request, for purpose of recruitment, both promotional and open competitive. The former have yielded fairly adequate results, but the latter, apparently because people have been pretty well absorbed by private industry or military service, or being free, are not attracted to state pay schedules, have been meager in results, particularly in the clerical series.

Pay schedules have been adjusted by special acts of 1945 and 1946 for both hourly paid and salaried groups as of October 1, 1945, and July 1, 1946. The mandatory salary increase act of 1945 made statewide a policy that this department had been pursuing since 1942, in granting an annual one step increase to those in the salaried personnel with service ratings above a certain grade.

As for the hourly paid, the flat rates up until July 1, 1946 for the four grades of maintainers have been 70, 75, 80 and 85c an hour, to which was added the economic increase of 7c and 9c an hour, dependent on the grade status of the employee as of February 1943, if he were then on the state payroll. The new rates as of July 1, 1946 are 77, 84, 89 and 94c per hour, to which is added a temporary increase for the fiscal year of 9c or 7c to apply to those on the payroll as of the July 1 date, the larger increase going to those getting 79c or less, and the smaller going to those with higher wage.

Records in our Personnel Section have been still further developed, clarified, and put in shape to afford information and checking when needed. Master cards have been prepared for hourly paid as well as salaried workers.

The whole structure of hourly paid worker allocations has been overhauled, systematized, and tightened up whereby the exact status of permanent incumbents in the four maintainer grade positions at any specified location, can be known from day to day, and controlled in accordance with the needs of the work.

Two intermediate or "dual" classes have been authorized between Grade I and II, and II and III. The men in either of these dual grades receive basically the pay going with the lower grade. When assigned temporarily to higher grade work they may now be paid at the higher rate.

On specially hazardous high level bridge work, hourly paid workers may now draw a wage of one and one-half times their basic pay. This special compensation has recently been extended to certain technical salaried men, usually engineers, so that on specified projects, doing specified work of a highly hazardous nature on bridges, their base pay when so employed is increased by 50 per cent.

Early in this period meetings with all hourly paid workers in the department were held at different locations in the field. The Commissioner, Deputies and Bureau Heads affected, met with the workers and discussed problems of mutual interest, such as work conditions, vacation, sick leave, pay schedules, and improvement in operating equipment. Much good was accomplished in showing up what each group had to face in its daily work.

Two large organized groups of department workers have been active in furthering the interests of employees along lines of improved work conditions and better pay scales, and discussion of grievances. Many conferences have been held with representatives of the Connecticut State Employees Association, and of the American Federation of State, County and Municipal Employees, A. F. of L. Many helpful suggestions have aided us in individual cases, and major legislative initiative has been brought to bear on important personnel bills effecting our workers.

Veterans. This state has made excellent provision for its returned veterans from this war.

In addition to the $100 bonus paid each inductee or enlisted man 90 days after entrance into service, it has made his service time count for retirement; has kept his job open for him upon return, and upon his reinstatement has given him all the rights of vacation and sick leave, as well as raises he would have had, had he been here at the time of increase.

Out of 497 employees in service from this department, 303 were back at work as this report was prepared. Another 83 returned and later resigned. No word has been received from 64, many of whom may be presumed to be in the service and 14 are known to have paid with their lives. Of the remainder approximately 20 are on leave of absence to continue their education under federal assistance laws. Preference in hiring veterans has been a standard order, and 295 new men, discharged from the armed forces, were on our payroll as of October 15, 1946.

The war memorial record board and service flag in our corridor installed early in the war, has been kept up to date by the thoughtful care and willing hands of several volunteer workers.

Special Studies. Legislative bills or requests for specialized study of different phases of personnel compliance with regulations, result in exhaustive research in our records and in turn lead to improved means of recording.

In the last two years, reports have been rendered on such interesting subjects as sick leave, emergency leave, rainy day effect on hourly paid workers, and overtime for certain salaried groups engaged in winter storm work.

Statistics. As of June 30, 1946, 1427 hourly paid workers were on the rolls as against 1069 on July 1, 1944 and 1709 in July of 1941.

Salaried employees numbered 937 as against 653 for July 1, 1944 and 1146 in July of 1941.

Retirements in this biennium as noted earlier in this report are as follows:

Disability	22
Service	13
Mandatory	27

Final date for release of persons working beyond mandatory retirement age under special war authorization of the Legislature, was set as March 2, 1946.

Twenty-five active personnel of the department died during the biennium and sixteen deaths occurred among retired workers. The first figure includes three deaths in military service.

Safety Engineering and Accident Prevention. Owing to the war and slow reconversion to normal activity, reactivation of this agency has been delayed.

The safe driving contest, has however, been carried on, and artistically designed certificates, signed by the Commissioner, have been awarded to the successful highway department drivers.

Comparison of common types of automotive accidents have been periodically compiled and released to the field. Considerable competitive interest has been thus aroused among our drivers, many of whom are recent appointees. The net result is a total of driving accidents which is relatively low considering the number of vehicle-miles driven.

Studies are now being made on the annual incidence of personal injuries of all types, to determine the question of preventability. This study segregates groups of workers, kinds of injuries, time lost by each, coverage by insurance compensation, and cost assumed by the State.

These studies indicate a need for a full time safety engineer to provide first aid instruction, to install safety methods and appliances in the field and shops, and thus to effect real economy in time and dollars lost now chargeable to carelessness of some employee.

Inter-Bureau Publicity and Notices. This form of employee information remains imperative as a means of getting notices through the department quickly.

Authorized changes made by the Governor, the Comptroller, the Personnel Director or Legislative Act, or originating in this department, bearing on any phase of work hours, compensation, leave status, or the like, starts a routine procedure. Each such notice goes into the mails the day it is received, on its way to the many bulletin boards in the field where it becomes accessible to all employees.

Such notices have been used extensively for bringing before our workers such worthy causes as War Bond buying, Blood Donations, Red Cross, Community Chest, Blue Cross Hospital Service, and the like.

Public Relations and Publicity — This section continued to be charged with the preparation and presentation of information concerning the plans and activities of the department for issuance to the

general public and to the employees of the department. It also continued the task of furnishing service items such as tourist maps, touring information, highway laws, etc.

In furtherance of the first part of its task, numerous news stories were prepared on a variety of departmental matters. Almost fifty of these, because of their general interest, were supplied to all of the newspapers of the state. A number of others were written for specific papers because of the purely local application of the material. While the foregoing were supplied on the initiative of the department, still other information was developed and articles were written at the special request of one or more newspapers.

The department's monthly publication "Cuts and Fills", is produced primarily for the information of the department personnel but in the nature of things, much of its content is of interest to the press. When it was established, just before the outbreak of World War II, the first issue cited it as a "means of exchanging views and broadcasting information about the activities of the department—about the things we are doing and the reasons they are being done . . . to give each individual member of the department . . . a clearer picture of the Highway Department as a whole."

During the war the news of normal peace-time activities was subordinated to the personal news of the 497 highway workers in the armed forces. With peace came the return to the original concept. New and old operations, special projects—including work for other departments—have received coverage.

Much of this has interest beyond the department and in consequence "Cuts and Fills" is supplied to all the newspapers of the state. It also goes to a number of publications in the field of highway construction and maintenance and, on an exchange basis, to a number of other states with similar publications.

This distribution has spread information over a wide field and has resulted in a considerable re-publication of information about the department by those who receive "Cuts and Fills".

In the trade paper field, several articles were written each year, some initiated here and some on request from the trade papers. Maps and photographs were procured where needed to illustrate the textual content of the material sent out.

A considerable volume of correspondence was conducted in replying to individual requests from the public for information about the department, its policies, individual projects under way or proposed, and the state highway system itself. In this last category were found those inquiries about routes, etc. by prospective tourists. Working arrangements have been in force between this department and the State Development Commission whereby material of both agencies is made available by either department to any inquiring tourist. This makes for prompt service and postage savings.

Assistance to the Commissioner in the preparation of his biennial report continued as one of the duties of the section. This included the final editing, publication and distribution of the document. The

section also compiled, edited, indexed and published the volume "Highway Laws", a biennial publication.

The information booth, clipping service and reservations and routing for official travel have continued to be charges of this section.

Inter-Agency Contacts. Increased tempo and broadening scope of work, plus changes required by Legislative action, tended to increase the contacts between this department and other agencies of the state during the biennium.

The Commissioner's responsibility and authority are established by statute and funds are provided by legislative enactment to carry out the obligations imposed on him.

Interpretation of these acts has necessitated many conferences, and requests for opinions from the Attorney General's office. In addition approval as to form is required on agreements, leases and certain forms of deeds.

Proper personnel recruitment and the application of regulations have resulted in countless conferences with the Personnel Director and his staff.

Legislation. The Legislative Session of 1945 passed many worthwhile acts improving the pay or work conditions of state employees.

These bills, and others affecting this department, were listed, hearings attended by designated department representatives, and reports filed here, on the proposed enactments. Charts were kept for ready reference showing the day by day status of each bill, and final disposition thereof.

Among important personnel enactments of the 1945 session may be cited:

An act allowing observance of legal holidays where employee does not have duties directly connected with the General Assembly on these days.

An act whereby no salaried employee shall be required to work on a legal holiday unless he be given equivalent time off.

An act authorizing any appointing authority to grant 15 working days or three weeks vacation with pay to a full time employee in the classified service, but making mandatory, a vacation to such person of not less than 12 working days or two calendar weeks.

An act adding two per cent per year to service retirement compensation after 25 years; the time lost by reason of injury sustained on the job to be counted towards retirement; services in the armed forces during wartime for subsequently employed veteran to be counted toward retirement, on payment of retirement fees; provision for reentry into retirement system of employees who have withdrawn retirement deposits upon previously leaving state service.

An act giving seniority of ten years or more, preference in position on any re-employment list.

An act giving seniority of ten years or more, prior consideration in matters of salary increases or decreases and layoffs as determined by merit ratings.

An act providing coverage at half pay for all lost time due to compensation injury lasting for two weeks or more after the date of injury.

An act authorizing the personnel director to establish a schedule of salary ranges for all permanent full time classified positions, providing for the number and size of steps in each position, and establishing the principle of an annual increase of one step for each employee whose service rating shall have been "Good" or better, during the preceding calendar year.

The Special Session of May 1946, among other bills, enacted an additional salary increase bill, under which the old economic increase increments were frozen into the existing salary ranges by raising the bottom and top figures for each range, as of July 1, 1946. Employees on the payroll as of that date, also became eligible for an extra cost of living salary adjustment.

Special Assignments. Under this heading may be grouped activities not directly covered under preceding paragraphs. Such things as court testimony, receiving department writs, special investigations, and the like. All department drives for worthy causes are outlined and executed here.

A manual describing the organization of this bureau, with duties performed by its several components, was compiled and distributed in the department for the first time in the spring of 1946, along with manuals newly compiled in other bureaus.

At the same time was released a Handbook of Rules compiled for the guidance of personnel on rules applying to their day by day conditions of work and wage.

A companion book, Personnel Procedure, outlining the authorized forms used in field and office and describing where and how each form should be used is about ready for the press.

Conclusion. All of the work of this bureau in actuality revolves around personnel or people, in one aspect or another. The study of human relations, necessary either under a modern merit system or any organized procedure is at once both extremely interesting, and at the same time highly exasperating. It is interesting because work conditions are never static where people are concerned, and no two problems are ever the same. It is exasperating because a small percentage of people appear unable to respond to a reasonable approach or analysis of the particular problem involved.

Such instances, however, highlight the fact that much constructive work has been accomplished during the last biennium in overhauling the department organizational framework, reclothing that framework with such additional personnel as could be secured under current conditions, defining the duties and outlining the responsibilities of such personnel, generally tightening up in both precept and practice, and, it is to be hoped, morale as well.

Construction on the Wilbur Cross Parkway in North Haven and Wallingford, showing subgrade work and Quinnipiac Avenue bridge, prior to paving operations.

BUREAU OF ENGINEERING AND CONSTRUCTION

By LESLIE G. SUMNER, *Director*

General—From the begining of the biennium until the end of the war in the late summer of 1945 the work of the Bureau of Engineering and Construction followed the general pattern discussed in the report for the period from 1942 to 1944. Restrictions and shortages caused by war prevented anything approaching a normal program of construction work and major activities were confined to the preparation of plans for post war construction.

The few projects which reached the construction stage were of small size and involved a minimum of "Critical" material or, more rarely were regarded as essential parts of larger construction, already completed. Construction progressed with difficulty, mainly because of labor shortage. Planning for post-war construction progressed satisfactorily, in spite of some shortages in trained personnel arising out of losses to the armed forces and war industries.

With the end of the war came a rapid relaxing of government restrictions which permitted a return to more normal procedures. Starting on September 4, 1945 and continuing through January 7, 1946 the department advertised and put under contract work on major projects estimated to cost upward of $3,500,000.

Of this total about $2,300,000.00 was applied to the construction of the section of the Wilbur Cross Parkway between Meriden and New Haven and represented a resumption of work interrupted in midstride by the coming of the war. In addition about $1,000,000 worth of Town Aid and minor state projects were also placed under contract.

Throughout the war, great emphasis had been placed by those in prominent or official positions, upon the necessity of having on hand large stocks of plans for public works projects, completely developed and ready to convert into contracts at short notice; this on the theory that such work would be necessary to absorb the slack caused by cancellation of war contracts. Proceeding in this theory, the department planned to resume an intensified letting of highway and bridge contracts in the spring of 1946.

However, even before the start of the 1946 construction season, it became apparent that the great demand for civilian goods was far in excess of the ability of our partially reconverted industry to produce, and that shortages nearly equaling those in effect during the war, would continue for an indefinite period. The situation was further complicated by the occurrence of numerous paralyzing strikes.

Under these conditions, the role of highway construction changed materially from that anticipated. Instead of supplying an outlet for surplus labor, materials and equipment, we found ourselves struggling against many difficulties, to provide long deferred and badly needed improvement and extensions to the highway system.

As might be expected, costs have increased materially over prewar prices, particularly for items in which labor plays a large part. Only in the field of heavy excavation, where increased use of new and

improved machinery offset other rising costs, have prices remained more nearly comparable to those prevailing before the war.

To make intelligent awards of contracts as a result of bids submitted under such conditions has been a major task of the bureau. From the first letting of the 1946 season on March 25, to the end of the biennium on June 30 the department offered 69 projects to bidders. As a result, 46 contracts were awarded, totaling in excess of $4,000,000. Twenty-one bids totaling $2,900,000.00 were rejected as unreasonably high and on two projects no bids were received.

In order to make an intelligent decision as to the acceptance or rejection of bids, it has been necessary for the Contract Section to make a careful analysis of each project to determine what its reasonable cost should be under existing conditions. This has added materially to the work of that section, but has supplied the background for decisions as to the award of contracts or the rejection of bids.

Division of Location and Design—During the first half of the biennium, work in the Division of Location and Design continued to be curtailed. Since the termination of hostilities, however, the great majority of our engineers who had served in the armed forces, returned to their pre-war jobs making this a period of unusual activity.

Two notable changes have resulted from the passage of the Federal Highway Act of 1944. First, the increase in Federal Aid Funds from approximately $1,000,000.00 per year in pre-war years to $4,800,000.00 per year for each of the first three post-war years, has resulted in post-war improvement programs which are almost entirely Federal Aid programs. Little State money remains after the matching of Federal funds, except Town Aid and Wilbur Cross Parkway funds. This has required extended cooperation with, and approval from the Public Roads Administration for practically our entire post-war state highway improvement programs.

The second notable change has been the emphasis on highway improvements to relieve urban congestion. Preliminary investigations, location surveys and detail designs of these present many highly complex engineering problems. The high standard of design of multi-lane, non-access expressways, the frequency of grade separation structures, and the relatively high cost of rights of way required to meet urban traffic needs, have necessitated extensive and intensive study for possible alternate designs in each urban area. The need for integration of state plans with those of local governmental units requires close and continued cooperation with local officials.

An instrument which has proven extremely valuable in expediting the work of the various units concerned with the design of post-war projects is the "Quarterly Report of the Design Section". The more important summaries of these reports are given under the comments on Highway Design.

As a result of the increased volume of work required for completion of projects in each post-war year program, and more especially the need for close cooperation between the Bureau of Rights of Way, the Devision of Bridges and Structures, and the Division of

Location and Design, a tentative order of lettings for a period of 12 months in advance has been initiated.

The location and design of Town Aid projects has continued to be a major function of the work of this Division.

Preliminary Investigations—Preliminary investigation of some of the more important major improvements undertaken during the biennium include alternate location studies of Route 6 through central Waterbury, Route 9 through Wethersfield and Middletown, and Route 15 in the East Hartford-Glastonbury area. Each of the above projects is planned to relieve urban congestion in its area. Comprehensive traffic studies have been conducted by the Bureau of Highway Planning Studies and the conclusions developed have provided the basis of the traffic needs of these improvements.

Location Surveys—Location surveys of the major projects which were undertaken include Route U. S. 6 from central Waterbury easterly toward Southington, Routes 8 and 65 in the Ansonia-Derby-Shelton-Seymour-Naugatuck area, Route 9 through Water Street in Middletown, Route U. S. 1 in Madison, Clinton, Westbrook and Old Saybrook, as well as in Old Lyme and East Lyme, and the proposed Hartford-New Britain Expressway. The biennium witnessed the completion of a survey of a tentative location of the proposed Fairfield County Relief Highway from Greenwich to Fairfield.

Highway Design—The policy of designing town maintained road projects in the residency offices has been extended to include trunk line and Federal Aid secondary projects. Several in these categories are now being designed in the various residencies. The more complicated trunk line and urban projects will be completed by the Highway Design Section in the Hartford office as heretofore.

Projects which were completed by the Design Section during the biennium may be summarized as follows:

Type	*Miles*	*Estimated Construction Cost*
Wilbur Cross Highway (Federal Aid)	15	$ 2,784,000
All other Federal Aid	16	3,036,000
Wilbur Cross Parkway	34	6,670,000
Trunk Line	13	1,256,000
Bond Issue	3	383,000
State Aid	27	370,000
Town Aid	144	3,317,000
Total	252	$17,816,000

The status of all projects in the Highway Design Section as of June 30, 1946 and the comparative status of June 30, 1944 are as follows:

	June 30, 1946		June 30, 1944	
	Miles	*Est. Cost*	*Miles*	*Est. Cost*
Design Complete	113	$10,945,000	58	$6,088,000**
Design Complete Except for Property Acquisition	13	395,000	38	2,576,000
Design Complete Except for Approval of Public Roads Administration	35	3,689,000	0	.....
Design Incomplete	127	18,989,000*	90	19,025,000
Design Not Started	29	1,293,000	85	4,794,000
	317	$35,311,000	271	$32,483,000

* 56% or $10,634,000 complete.

** Included in this amount is approximately $2,900,000 of work which has been revised in order to incorporate (1) changes in the revised standard specifications, (2) revision in estimated unit prices and/or (3) certain changes which were necessary to meet Federal Aid participation requirements.

A detailed breakdown of the status of design work classified by highway systems as of June 30, 1946 is given in the Appendix as Exhibit E.

Among the projects of considerable magnitude on which the design has been completed, or substantially so, are the Wilbur Cross Parkway (with the exception of the proposed tunnel through West Rock in New Haven), the Wilbur Cross Highway, the approaches to the Charter Oak Bridge, Route 34 (Derby Avenue) in Orange and Derby, and Route 44 from New Hartford to Winsted. Roadway design is well advanced for the section of Route U. S. 6 from Southbury to Newtown, and the North Meadows Highway north of Morgan Street in Hartford. The closing of the several gaps in the important Naugatuck Valley Road (Routes 8 and 65) from Bridgeport to Waterbury has likewise shown considerable progress.

Many minor yet desirable Trunk Line projects such as sight line improvement, temporary pavement replacement over swamp areas and at bridge approaches, have also been completed.

Old Lyme-Old Saybrook Bridge—Acting as agent for the Bridge Commission, the department has made rapid progress on the development of plans for the proposed Old Lyme-Old Saybrook Bridge and the approaches thereto. This work, with the exception of the design of the river bridge and several smaller structures, has been conducted as a special project under the direction of a Project Engineer. Preliminary investigation and location surveys have been completed and the design of the bridge and approaches are well advanced. This project, estimated to cost approximately $6,000,000.00 was the largest single improvement initiated during the biennium.

Division of Contracts and Construction — Order L-41-E, dated April 1944, limiting the cost of construction to $10,000 or less and restricting the use of critical materials, was in effect until September 7, 1945, thus curtailing construction for the major part of the biennium. However, during the period 72 projects were completed by contract. (See Exhibit F.)

Construction on Wilbur Cross Highway east of Connecticut River showing subgrade work in Manchester and Vernon and the start of the Hockanum River bridge in East Hartford.

Three of these projects. approaches to the New London Bridge, Routes U. S. 1A and 84, Groton, were completed after having been shut down by the War Production Board since 1942.

The Riverfront Boulevard and Park River Express Highway in Hartford were completed.

One grading project on the Wilbur Cross Parkway in Wallingford was completed.

The remainder were mostly Town Aid roads and small drainage and bridge repair on Trunk Lines.

In addition to projects completed by contract there were 53 Town Aid projects in 36 towns built by town forces. These projects amounted to $538,290.

At the end of the biennium there were 60 projects under contract. Fourteen of these projects are grading and grade separations on the Wilbur Cross Parkway between New Haven and Wallingford. There are 12 Federal Aid projects, five of which are on the Wilbur Cross Highway between East Hartford and Vernon.

In addition to projects under contract there are 39 Town Aid projects being built by town forces.

Thirty-six projects amounting to over $3,000,000 were advertised but all of these bids were rejected because of extreme prices.

Division of Bridges and Structures—The past two years were ones of transition covering the last war year and the first peace year. The period witnessed the return of practically all of the members of the division who had served with the several branches of the armed forces in various parts of the world.

During the war, new projects were curtailed and existing structures were nursed along using as little critical material as possible, with the result that the end of the war found us with old structures which had outlived their usefulness and a program of new structures, construction of which had been delayed for 5 years.

During the first half of 1946, a start was made on three of the outstanding new bridges scheduled for construction in the near future, namely the new four-lane bridge over the Connecticut River between Old Lyme and Old Saybrook to replace the existing two-lane structure, and the new highway viaducts in Waterbury and Shelton.

The two viaducts are now in elementary stages of design, but design on the Old Lyme-Old Saybrook bridge is sufficiently advanced so that it is planned to advertise for bids the latter part of 1946.

An outstanding piece of bridge reinforcement was performed on the covered wooden bridge at West Cornwall. This structure, after 109 years, has been reinforced and a new floor installed making the entire bridge capable of carrying 15 ton trucks. It was opened to traffic on May 17, 1946, and with the proper maintenance should be good for another hundred years.

With the increased work in sight during the next four to six years, it will be necessary to augment the personnel of the entire Bridge Division and steps have already been initiated toward such expansion.

Bridge Design Section—During the biennium complete plans and relative data for ninety bridges of various types have been forwarded to the Highway Design Section.

Of this number, eleven, mostly grade separation structures, were in connection with the Wilbur Cross Parkway and eight in connection with the Wilbur Cross Highway. In addition to the bridges on the Wilbur Cross system, design for twenty-five structures of Trunk Line-Federal Aid status were completed.

The remaining forty-six bridges, nearly all stream crossings, consist of thirty-seven Town Aid or State Aid and nine miscellaneous structures such as retaining walls, widening projects, sidewalks and bridge railings.

During the last third of the biennium several projects of considerable magnitude were started, the outstanding one being the Connecticut River Bridge. Designed to carry the Boston Post Road or Route U. S. 1 over the Connecticut and joining the towns of Old Saybrook and Old Lyme, this structure will be the third of its nature to be constructed over that River in the last decade.

Continuation of the Waterbury-Bridgeport improvement will involve the construction of a bridge over the Housatonic River (and several city streets) between Shelton and Derby. The estimated cost of this viaduct-structure will be somewhat in excess of a million dollars. Design is well under way but has been temporarily suspended pending a ruling of the War Department regarding river clearances.

Considerable progress has been made in the design of a viaduct within the City of Waterbury—a structure proposed to carry the principal east-west artery Route U. S. 6A, over all intersecting streets, and a railroad and a stream.

Completion of the Waterbury and Shelton-Derby projects, together with the miscellaneous structures incidental thereto will give the highly industrialized Naugatuck Valley more rapid and far safer access to Bridgeport and points beyond.

Bridge Inspection Section—The recommendations made by the various Resident Engineers in their reports on the thorough inspection of all existing bridges, were carefully scrutinized and checked wherever it was deemed necessary.

A maintenance program, showing major and minor repairs to the various structures, with the estimated cost of the repairs was prepared. Detailed plans, with specifications were prepared for major bridge repairs, such as redecking Washington Bridge over the Housatonic River on Route U. S. 1 between Milford and Stratford, Castle Bridge on Route Conn. 8 between Thomaston and Torrington, necessary gunite work on the bridge over the Saugatuck River on Route U. S. 1 in Westport, and other structures.

Special investigations of various city owned bridges were made at the request of city authorities. Detailed reports were rendered and plans and specifications prepared for such improvements as increasing the carrying capacity and equipping the structures with permanent roadway decking.

Communities such as the City of Bridgeport, for whom plans and specifications were prepared for the underpinning of the pier of Pleasure Beach Bridge and the redecking of Yellow Mill Bridge, asked for the engineering service and reimbursed the Department for the work rendered. The City of Naugatuck as well as the City of Ansonia availed themselves of such service. The Towns of Sharon and Cornwall jointly asked the Department to save and strengthen the old covered wood bridge over the Housatonic River on Route 128. However, the bridge maintenance section accomplished the objective in accordance with the plans prepared by this section.

To enable shippers and trucking concerns to lay out their various routes efficiently, a list is prepared showing the carrying capacities, as well as the overhead clearances of the various bridges.

Movable bridges received special attention of the Bridge Inspection Engineer and the necessary repair work or improvements were planned and carried out by the bridge maintenance section in accordance with his plans.

Bridge Maintenance Section—The Bridge Maintenance Section has continued its routine duties of bridge and ferry maintenance, operation, and repair. The shortage of materials continues acute but during the past year the manpower shortage has been eased somewhat. This has enabled us to resume the painting program, virtually abandoned during the war. Bridges painted in this bienium include Gaylordsville in New Milford, Quinnebaug in Killingly, Castle in Harwinton, Quinnebaug in Canterbury, the "Dry Bridge" in East Hartford, the Farmington in Windsor, and the Connecticut at East Haddam.

The Section has been called on by several towns and State Commissions to do work which they were unable to accomplish through ordinary means. An interesting example was the reconstruction of the covered wooden bridge over the Housatonic River for the towns of Cornwall and Sharon. The maintenance of the toll recording equipment and electrical installations on the Charter Oak and Groton-New London Bridges and at the Toll Stations on the Merritt Parkway has been successfully continued.

In line with the policy of modernizing our movable bridges certain structural reinforcing has been done at the Stratford Avenue Bridge and this structure has also been entirely rewired. A new pressure lubricating system has been installed on the Tomlinson Bridge and the auxiliary generator has been reconditioned.

The hurricane which struck Connecticut on September 14, 1944 fortunately did little structural damage but the accompanying high tide inundated the counterweight pits on the Stratford Avenue and Tomlinson Bridges. At the latter, the operating motors were immersed. Through the efforts of our forces and with assistance in pumping from the Coast Guard and the Bridgeport Fire Department, operation was resumed at Stratford Avenue on September 16 and with the aid of the Coast Guard and the New Haven Fire Department at the Tomlinson September 17. Due to the demand for men and equip-

ment at this time, this prompt restoration of service is considered excellent.

A marine railway has been constructed at the East Haddam Plant where the Hadlyme and Rocky Hill ferries are now hauled out and reconditioned during the winter months.

In addition to the routine maintenance of electrical and toll equipment the electrical section has designed and supervised the reconditioning of electrical equipment on the Washington Street Bridge for the Town of Norwalk and has assisted materially in the design of street lighting for the Groton-New London Bridge. The routine inspection of all electrical installations under control of this section is now handled by this group. Portable infra-red lamps have been ingenuously and successfully used in baking out bridge motors in place, a decided improvement over former methods which involved removing motors from the bridge and baking them in commercial repairer's ovens. The new process saves time and money and causes less public inconvenience.

Due to the expanded construction program of the department the number of men engaged in test boring has increased three-fold. The acquisition of a new light test boring rig has expedited the work in rough terrain. Possibly the outstanding test boring project accomplished was in the spring of 1946 for the contemplated bridge across the Connecticut River at Saybrook.

Among the repairs may be mentioned the reconstruction of the West River Bridge in New Haven, the replacement of the Muddy River Bridge in North Haven, the reconditioning of two bridges on the west approach to the old Thames River Bridge prior to their transfer to the City of New London, the redecking of the Pomeraug River Bridge in Woodbury, and the Naugatuck River Bridge in Seymour, and the reinforcing of the Lieutenant River Bridge in Old Lyme.

Among the problems now facing the Section are the replacement of worn-out and inadequate equipment, the replacement of high maintenance wooden bridge decks with steel grid or concrete, the modernization of inadequate structures, and the installation of a policy of preventive maintenance rather than one of constant repairs.

BUREAU OF ROADWAY MAINTENANCE

By A. L. DONNELLY, *Director*

General. During the last two years the strain on the Roadway Maintenance Organization was severe. There were handicaps. Labor was at its lowest ebb, with too few men to operate trucks in winter. There was continual fear of old trucks breaking down with no replacements possible, and scarcity of necessary materials.

The entire state was densely covered with defense factories and practically every state highway was an artery of travel for war workers. There were continuous streams of trucks transporting war

goods with loads far in excess of statutory limits, heavy military convoys and transportation of explosives for the Army and Navy. The maintenance crews' part in the war effort was to endeavor to keep each road safe and passable, day and night, winter and summer. Our workers did a splendid job. The State Police were very cooperative. There were tie-ups in the winter at times beyond the control of the men, mostly due to trailer trucks endeavoring to proceed in storms without chains.

It was necessary, in general, to defer roadway betterments. Some projects were carried on, mainly the most urgently needed sub-surface and surface drainage work, some improvements in pavement cross section and sight line where the analysis of accidents by the Division of Highway Control showed the immediate need of correction. A limited program of stone surfacing was carried on. Two crews worked on mud-jacking settled sections of concrete. Studies were continued by towns, of the most efficient and effective sign marking on all state highways and existing signs on about 50 per cent of the state roads have been inventoried and readjusted to give the most desirable warning and directional values. The system inaugurated for analyzing motor vehicle accidents over a period of several years by locations and types has produced valuable results in isolating locations requiring improvements to reduce accidents. Two additional districts were established for pavement markings, making a total of five, to give more prompt traffic line painting service. In the spring of 1945-46 the center line striping of straight-of-ways on concrete was made a standard practice so that now on all state highways the white center line, so important to night driving, particularly under foggy conditions, will be maintained.

Winter of 1944-1945. The most severe strain came in the winter of 1944-45. There were no spare men available. Many trucks had only one man sanding. This was extremely difficult and arduous, particularly where sand had to be loaded by hand. Severe snowstorms during extremely cold weather made this winter one of the worst ever experienced. During late December, January and February there was one snowstorm after another with zero temperatures and severe winds, whipping snow off fields and filling up roads as fast as they were plowed. The 382,069 feet of snow fence and the heavy duty trucks and modern plows used by the department saved the state from having a large mileage of roads blocked. Many towns in Litchfield County and upper Hartford County were unable to open their town roads. Farmers were snowed in, people were without food and fuel, and the Governor's War Council called upon the department for assistance. This bureau worked with the War Council and all contractors with available equipment were called upon to help. Through the efforts of the department and the Public Roads Administration, the War Department declared a war emergency existed. The Army Base at Bradley Field furnished rotary plows and crews for a period of about two weeks to assist some of the towns with the most serious conditions. The City of Bristol loaned its rotary plow

as did Pratt and Whitney Division of the Niles, Bement, Pond Company. The emergency equipment was worked day and night for two weeks to get the town roads open. In some cases of severe illness, the State Police called upon the State Highway Department to assist in opening town roads. These were locations where snow-bound persons required immediate medical attention. We will never forget the wonderful work done by our maintenance forces and those of all other bureaus during that winter.

Spring Break-ups. To expedite movement of war goods over highways, it was necessary to allow loads in excess of statutory limits. These abnormal loads had a serious effect on older sections of heavily truck-traveled main roads. Government war agencies required truckers to purchase trucks in excess of Connecticut statutory capacities. By authority of the Governor's Committee (Highway Commissioner, Motor Vehicle Commissioner, and Public Utilities Commission) these trucks were continued for a limited time after the termination of the war. These excessive loads broke up roads which normally were stable, particularly in the spring of 1945-46. Due to the heavy rains in the fall of 1945 there was an unusually high ground water table when the cold weather set in. The winter was exceptionally severe with no long thawing periods during the winter. As soon as the spring thaws came there were bad road breaks all over the state. Maintenance men gave these conditions undivided attention for the three weeks during which the frost was leaving the ground. No roads were closed but some sections were quite rough. Permanent repairs could not be made until the frost was all out but the public accepted the situation with good grace. Road conditions were the same all over New England. The extensive program of subsurface drainage installations on Connecticut state highways during the past five years helped immensely in limiting the number of locations where bad frost heaves occurred.

Scarcities and Increased Costs. The primary feature in maintenance of waterbound macadam roads and gravel shoulders is so-called "oiling". We were very fortunate in being able to acquire sufficient tars and asphalts during the war and delivery service from vendors was exceptionally good. Most of our regular dealers of trap rock, gravel, sand, bituminous materials, snowplow blades and hone blades went out of their way to help us. The department's Purchases Coordinator's long standing business friendship with vendors and his satisfactory methods were in large measure responsible for the service we received. One of the materials practically impossible to get, was paint. We were fortunate in having a large supply of pre-war traffic paint in stock which carried us through 1945. Material prices were increased over 1941 as follows:

Asphalts	41%
Tars	68%
Trap Rock	30%
Guide Rail Posts	100%

The scarcity of lumber for domestic use made it difficult to get an adequate supply of guide posts. This, with labor shortage, results in a large amount of deferred maintenance of posts in guide railings. The long life of our wire cable was extremely helpful as little replacement was necessary. The upkeep of guide railings is one of the major items of highway maintenance. There are over four million feet of guide railings on the state system. The road liability statute, in part, makes the highway commissioner responsible for the installation of guide railings wherever the roadway is raised above the adjoining ground so as to make an unsafe condition. No other state is known to have as much responsibility. About 2,900,000 feet of railing still have native untreated posts which will undoubtedly have to be replaced within the next few years. Untreated native guide rail posts were completely replaced with full pressure-treated creosoted posts in 277,960 feet of railing in 1944-1945 and 232,950 feet of railing in 1945-1946.

Before the chestnut blight, chestnut posts were standard and had a life of as much as fifteen years. Since the blight no other native wood was available to give untreated a reasonably economic life. In 1939 we discontinued using untreated native posts because their short life made maintenance extremely costly. We substituted pressure treated creosoted posts with an estimated life of about twenty-five years.

Mr. Henry W. Hicock, Forester for the Connecticut Experimental Station started five years ago to make field tests on various untreated and treated posts in State Highway guide railings, to establish the relative life of different species of wood and different treatments, as well as comparative economic values. It is expected that the survey will be completed in 1947. The results should be very beneficial. At present we are using full pressure treated creosoted southern pine posts, no bids being received on similarly treated native posts. The Conwood, Inc., New Haven, of which Mr. Edgar Heermance is Secretary, is endeavoring to build up the interests of a commercial organization in utilizing native timber and full pressure treating with creosote at a plant in Montowese. There should be many uses for such treated wood besides for posts. The department would prefer using native posts fully pressure treated with creosote if they met our standard specifications and could be purchased under competive bidding. We have advised Mr. Heermance of our estimated annual requirements and of our desire to cooperate and of our hope that some enterprising agency can work this out profitably to take over the barking, seasoning, roofing, boring and treatment of native timber cut from Connecticut forests.

Labor Problems. About 125 Roadway Maintenance men entered the military service and have very creditable records. After the war a large percentage of the veterans returned to their former status. Loyalty to the state, security of State Service, retirement benefits and benefits of sick leave were largely responsible for the many older state employees not leaving for more lucrative jobs in defense factories.

The maintenance of state highways was early recognized as essential and a number of skilled men within the draft outside of certain age limits were exempted. Mr. Scoboria and his staff were extremely helpful in assisting in getting replacements for men who entered the military service, and also in helping to fill the gap where men left to go into defense factories, either due to special skill or bigger pay. New men, naturally, did not have the interest in our work that older employees had and when more attractive offers came along quite a large number of them left. The turnover was quite heavy even with an increase of labor rates of about 54 per cent from 1941 to 1946, and resulted in a great decrease in efficiency. The fact that new men, even after months of service, were unable to get the same pay as men who worked along side of them on the same work, was responsible for considerable dissatisfaction and lack of interest. This was due to the application of the 1943 economic increase. The labor problem continued to get worse, the low ebb of hourly paid men employed being in the summer of 1944 and the winter of 1944-1945.

Equipment Problems. Before the war about fifty heavy duty trucks were replaced annually to assure a safe operating fleet for winter maintenance. During the four years of the war no new ones were obtainable and the problem was to try to keep the old trucks in service. The supervisory men and the shop mechanics in the Division of Property Control did a fine job in getting parts, making emergency repairs, day and night, and keeping the trucks rolling. There naturally were a lot of breakdowns and it was hard to get truck parts but the shops managed to get the trucks back on the road promptly. Exceptional foresight was used by the Bureau of Business Administration before this country got into the war in building up a surplus of standard large truck parts. As parts were used from this surplus stock, replacements were ordered. At the end of the war about 200 trucks were being operated which normally should have been replaced.

State trucks are charged to projects on a rental basis. Rates are established from cost of maintenance, storage, depreciation and insurance. Old trucks had to be kept in repair but it was expensive. Costs of rentals increased 106% over that in 1941.

Mudjack Work. With the use of two mudjacking machines, settlements in sections of concrete pavement were corrected at twenty-three locations in 1944, twenty-four locations in 1945. In addition to raising sections of road which have settled, mudjacking has been effective in increasing the banking on curves through progressive increases in amount of raise transversely across slabs. The unit cost varies considerably due to the amount which the slabs have to be raised, the traffic conditions, whether or not the slabs have moved laterally and the porosity of subgrade. The costs for four years are shown below:

Year	*Area (Sq. Yd.)*	*C. Y. Loam*	*Bags Cement*	*Inches Lift*	*Total Cost*	*Per Sq. Yd. Cost*
1942	8,659	406	812	3.01	$15,424.37	$1.78
1943	8,089	749	1,500	5.07	30,704.00	3.79
1944	10,871	565	1,133	2.85	18,011.49	1.66
1945	18,249	763	1,503	....	26,171.41	1.43

Prior to the winter of 1945-46 all mudjack work was done in the spring, summer and fall. Drilling of holes in concrete for use in pumping up of slabs is the first phase of mudjack work. This drilling takes considerable time and slows up work of mudjack crews. In the winter of 1945-46 we experimented in advance in drilling of holes. This will make a marked increase in the amount of actual mudjacking accomplished in a year.

Guide Rails. Due to the inability to obtain reflector buttons for guide rail posts to meet standard State Highway Department Specifications, reflectorized bands were used as a substitute and were very well received by the public. When we are in a position to get specially treated metal for backing of Scotchlite reflectors more satisfactory results will be obtained.

Each year new guide railings are installed at a number of locations in the state partly due to changed conditions on adjoining property making shoulder slopes unsafe. New installations were made for a total length of 15,080 feet in 1944-45, and 17,010 feet in 1945-46. Salvage cable from sections of guide railings eliminated was used.

Due to the inability to obtain new wire rope cable a number of locations on shallow fills were selected for the removal of guide railings in order to salvage cable. Before railings were removed, additional fill was placed to give slopes, considered safe, of one foot vertically for four feet or more horizontally. In 1944-45, 36,900 feet of guide railings were thus eliminated, and in 1945-46, 36,790 feet.

Surface Drainage Replacement. Needed reconstruction was performed in connection with replacement of culverts. Stone box culverts on which sidewalls and headwalls had collapsed or metal and dual culverts which had partially collapsed, were replaced. The following table shows the comparative quantity of pipe installed during the past five year period.

	Sizes (Diameter)	*1941*	*1942*	*1943*	*1944*	*1945*
Reinforced Concrete Pipe ...	12" to 72"	3,072	3,712	2,374	2,738	4,234
Bituminous Coated Corrugated Metal Pipe	15" to 60"	501	478	534	940	572
		3,573	4,190	2,908	3,678	4,806

Additional Surface Drainage. The satisfactory and adequate disposition of highway drainage is a problem beset with many perplexities. All side hills are water sheds and roads constructed there must have provision for the water to continue to shed through the new highways. This is done by constructing culverts or bridges under the roads. It is impractical to allow the water to shed under the road for the full width of the side hill. It has to be concentrated in a culvert or bridge having adequate area to provide for free flow which naturally concentrates the water on the receiving end. There generally has been no problem while the property is undeveloped but it is in the development or cultivation of such land that problems arise. Crossing natural waterways with highways is no problem for

the state as each property owner is obliged to keep such water course open through their own property. Water falling in the highway area which cannot directly be shed off the side of the road is carried in gutters to the most natural locations for disposition.

Letters from the public, complaining of damage to their property due to drainage from state highways, have been given careful consideration in all cases. In many locations regrading of gutter sections or berming of gutters to confine the water to the highways have accomplished the desired results of abating the water nuisance. Complaints difficult of adjustment involve discharge of surface water from culverts onto adjoining property. Such water, particularly where severe damage is caused by erosion, requires installation of pipe or paved ditches. Easements for drainage are obtained from property owners before such work is performed.

On all state highway construction since 1932 and 1933, drainage easements have been acquired from property owners at all outlets other than natural water courses. Prior to that date, rights were acquired in but few locations where culverts discharged water into adjoining property. With changes of ownership or land use, there has been an increasing volume of requests for removal of culverts or other disposition of water flowing from such culverts.

The Attorney General has rendered opinions concerning establishment of rights by prescription for the concentration of highway drainage onto adjoining property. Fifteen years of continuous use establishes such right, provided the discharge has been open and easily observed. Section 5965 of the General Statutes provides for rights by adverse use. Written opinions from the Attorney General, dated February 17, 1944 and September 11, 1945, support the state's rights under the statute. An opinion of the Attorney General's Office of July 19, 1945 clarifies prescriptive rights. Careful consideration and considerable judgment is required in the application of this statute to each individual problem.

New surface drainage installations in 1945 were made only at locations where lack of structures required expenditures to reduce traffic hazards and excessive maintenance cost. The importance of the highway to be improved and the traffic volume determined the locations. Eight new drainage rights of way into private property were acquired to provide economical outlets for part of the drainage. The following table shows the type, quantity and size of pipe installed in the years 1941 to 1945, inclusive:

	Sizes	*1941*	*1942*	*1943*	*1944*	*1945*
Reinforced Concrete Pipe ...	12″ to 48″	23,005	6,784	13,901	14,327	11,580
Bituminous Coated Corrugated Metal Pipe	12″ to 36″	1,980	504	712	548	1,196
		24,985	7,288	14,613	14,875	12,776

Sub-Surface Drainage. No maintenance improvements are as effective in making older roads in the State Highway System suitable to withstand present normal traffic than sub-surface drainage in-

stallations. This work was started in 1939 and has been continued each year since. Locations which have broken up regularly each spring and at times during the winter have been stabilized through perforated pipe installations in underground seepage areas. Six and eight inch pipe, backfilled within six inches of the surface with a small pervious aggregate, is installed at depths determined by the Soils Engineer after examination of the water carrying strata in the tests pits dug along line of proposed drainage.

In 1944 and 1945 it was impossible to complete a large number of planned sub-surface drainage work. For instance in 1945, sixty-one projects were planned of which seventeen were not carried out due to lack of time or inability to obtain power equipment, nine others were canceled and thirty-five were completed. Out of the planned quantity of 24,880 lineal feet, only 17,826 lineal feet were installed. Sub-surface drainage installations from 1940 through 1945 are as follows:

Year	Lineal Feet
1940	53,862
1941	65,428
1942	23,582
1943	19,739
1944	10,458
1945	17,826

From research on sub-surface drains, conducted first by H. R. Turner, Engineer of Drainage in 1940 and later by Philip Keene, Soils Engineer, there has been worked out the present uniform procedure for investigation of soils, the present specification of backfill aggregate and the method of construction of subdrains.

From experience obtained on field installations and experimental work conducted by Mr. Keene in the soils laboratory, there has been adopted a standard filter medium consisting of 3/8 inch crushed stone or screened gravel or approved quality of bank run or stabilized gravel. In general, which of these aggregates is used is determined by the most economical haul from quarry or pit. Samples of aggregate selected are tested at the laboratory before acceptance.

The sub-surface drainage installed by the Bureau of Roadway Maintenance since 1940 is 190,895 feet in length. Such installations cut off water seepage at sides of roads and prevent it from getting under pavements, where freezing causes break-ups. They also eliminate the hazard of ice on pavement shoulders and surface. The cost of picking ice resulting from lack of sub-drainage, as differentiated from the ordinary sanding of ice has been reduced from $68,635.00 during the season of 1939-1940 to $22,616.99 in 1944-45, and $31,274.29 in 1945-46. These lower costs have been achieved during a period of rising unit prices for labor and equipment.

Frost Heaves. A survey of frost heaves in the State was made by the Bureau of Engineering and Construction during the early spring of 1945. This data is filed in the Soils Laboratory. The

Bureau of Maintenance has cooperated with the laboratory on this work, particularly in the three test sections where treatment of the sub-base with calcium chloride has been performed. Periodic levels are being taken on these test sections. Other experiments conducted by the Bureau of Maintenance involve the removal in certain locations of silty sub-base material having high capillarity and replacement with specification gravel. This required draining of the gravel fill to the outer face of the embankment or to a foundation underdrain if the location was in a cut. These experiments have shown positive results and have eliminated the periodic frost heaving. These soil experiments indicate the necessity for installation in construction work of clean sub-base material, properly drained, under pavements where clay or silty soils are located.

Stone Surfacing. The policy of stone surfacing stable waterbound macadam pavements was continued in 1944 and 1945. The large mileage of roads now stone surfaced have appreciably reduced the complaints from the public of the annoyance in driving through newly tarred roads, and has reduced the accident hazard due to furnishing a more skid-resistant pavement. In 1944, 145.91 miles of road and in 1945, 102.65 miles of road were stone surfaced, of which 64.11 and 34.90 miles respectively were on waterbound macadam pavements which had become stabilized through installing surface and sub-surface drainage during the past biennium. An experiment was tried in the stone surfacing instead of oiling of stable graveled shoulders. About forty miles of this work being done in 1945. Whether or not this practice will be continued will be determined by the economic value of this work. The use of stone surface treatment to seal old bituminous pavements and concrete pavements was used in 1944 to the extent of 66.49 miles and in 1945 to the extent of about 34 miles.

Betterments. Due to the labor shortage, the usual amount of pavement cross-section improvements was reduced during the war. This pavement cross-section work consists of modernizing the pavement cross-section on high crowned roads and in superelevating curves, that is, banking sufficiently to provide for safer riding and in improving alignment. There was some work done however during 1944-45 and 1945-46, the main projects being in Woodbridge.

Services For Other Departments. The number of institutions for which the State Highway Department performed pavement maintenance and winter maintenance increased considerably over the previous biennium. The services performed for various agencies were as follows:

Snow and Ice. Work at State Office Building, State Library, State Capitol Grounds, State Police Grounds, Hartford; Fish Hatchery roads at Berlin, Burlington and Windsor Locks; Governor's Mansion grounds, Hartford; Morway Farm Road, West Hartford, State Guard; Radio Tower Road, Avon, State Police.

Pavement Maintenance at Laurel Heights, Shelton, Teachers College, Danbury; State Hospital, Fairfield; Training School, Southbury; State Police Barracks, Connecticut Reformatory, Cheshire; Long Lane Farm, Middletown, State Hospital, Middletown; Mystic Oral School, Mystic; Camp Baldwin, Niantic; State Farm for Women, Niantic; Seaside Sanatorium, Waterford; University of Connecticut and Mansfield Training School, Mansfield.

Snow and Ice Work and Pavement Maintenance at State Bulding, Bridgeport; Undercliff Sanatorium, Meriden; Uncas-on-Thames, Norwich; Norwich State Hospital, Norwich; Cedarcrest Sanatorium, Newington; State Teachers College, New Britain, and Bridge Commissions, New London and Hartford, highways.

At the start of the war the State Highway Department truck drivers and certain foremen were organized into a special State Guard emergency unit to be called upon as required in transporting guardsmen, and functioned throughout the war. In the summer of 1944 all troops and equipment were transported to Camp Baldwin at Niantic and returned. In the summer of 1945 troops and equipment were transported to Camp Baldwin. In 1944 troops were transported to and from maneuvers in Wilton.

The funds expended for services to other State Departments and Institutions is summarized below:

Recoverable Accounts

	1944-1945	*1945-1946*
Snow Removal	$10,927.79	$13,090.45
State Guard	12,775.54	3,164.69
Repairs and Oiling	17,884.50	25,868.30
Total	$41,587.83	$42,123.44

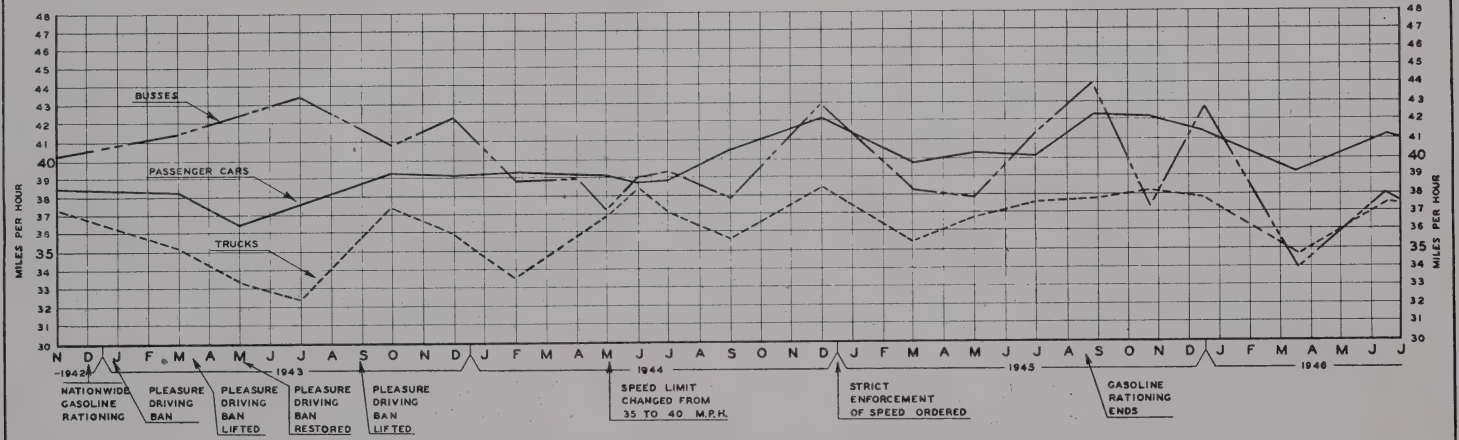
DIVISION OF HIGHWAY CONTROL

The past biennium shows the traffic pattern on the State Highway System changing from one of comparatively light traffic volumes traveling at speeds consistent with wartime restrictions to one approaching nearly normal volumes and speeds. The resumption of near normal conditions immediately following VJ-day resulted in a sharp rise in the number of traffic accidents. If this increase in accident rate is maintained, future annual totals are bound to exceed the figure for 1941, the highest on record.

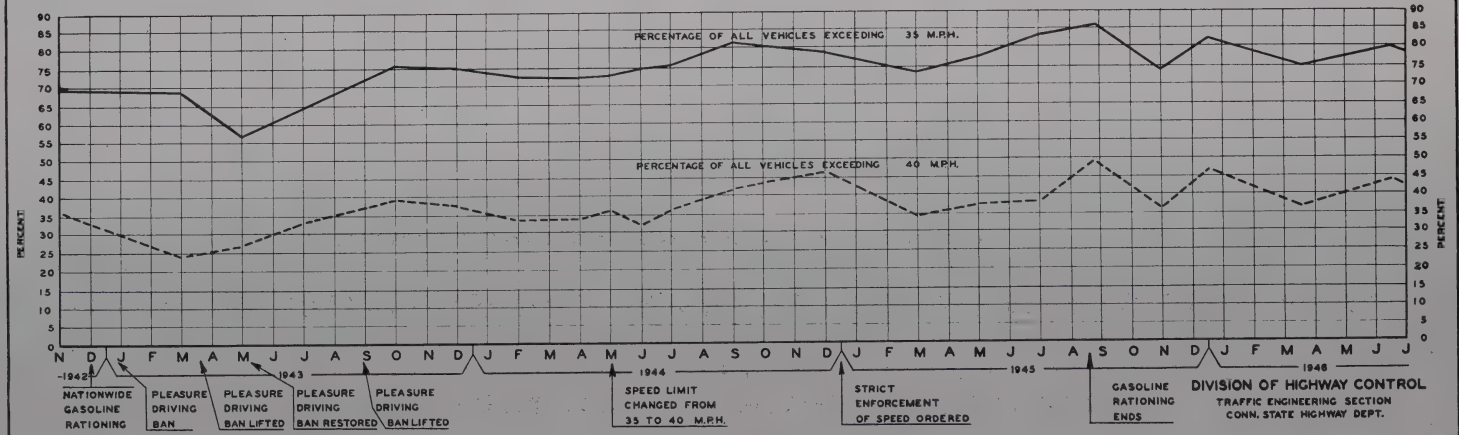
Traffic Engineering Section: The Traffic Engineering Section has functioned with only 50 per cent of its normal personnel, but quality of performance of this unit is indicated by the recognition of its extensive efforts. The State of Connecticut participating in the Traffic Safety Contest conducted by the National Safety Council, won the Grand Award for 1944 and was first in the eastern group for 1945. The section ranked second among the eastern states and tied for second place among the forty-four states submitting reports

TYPICAL SPEED TRENDS ON CONNECTICUT STATE HIGHWAYS

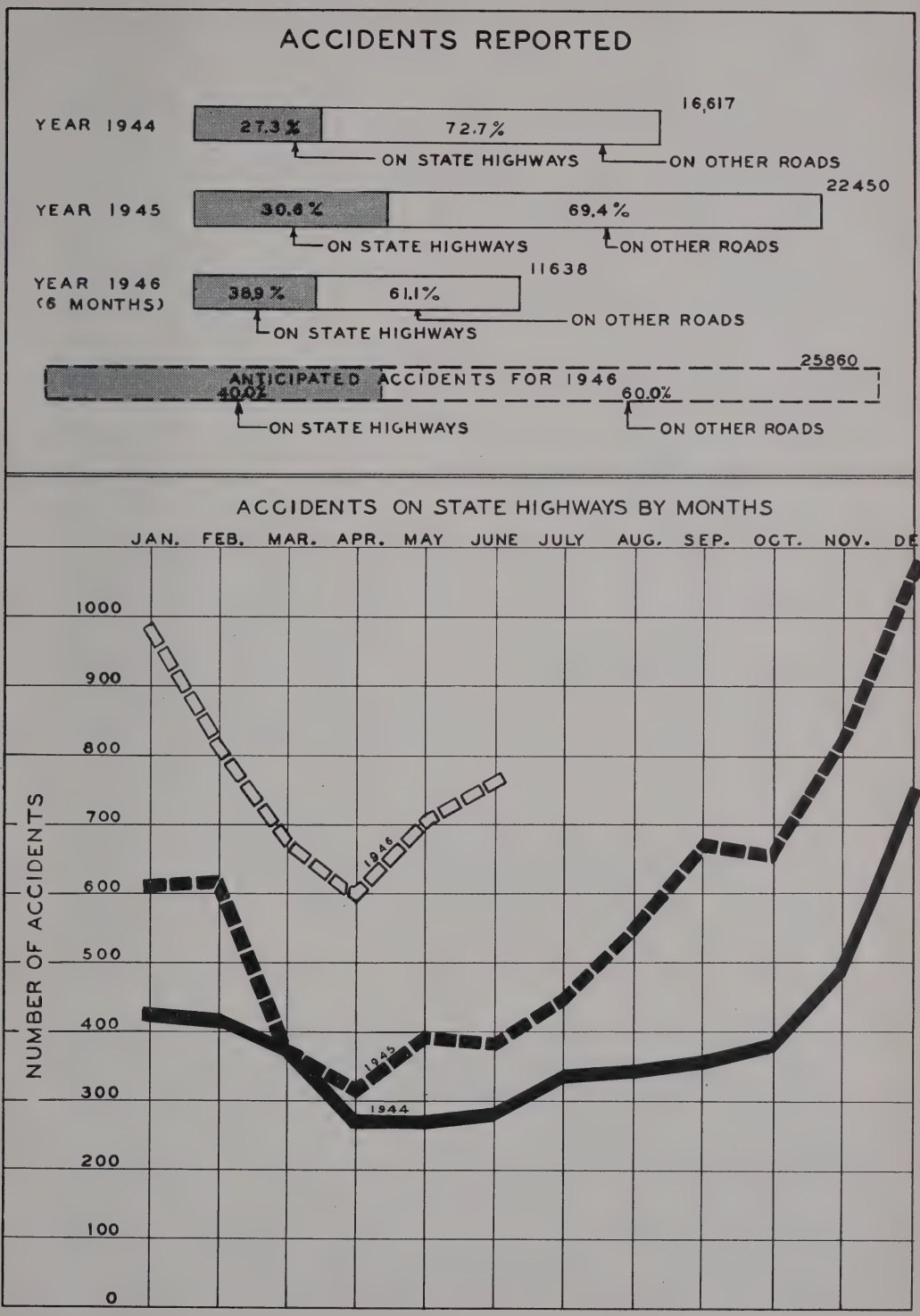
AVERAGE SPEEDS BY PERIODS AND TYPE OF VEHICLE


MILES PER HOUR
BUSSES
PASSENGER CARS
TRUCKS
N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J
1942
1943
1944
1945
1946
NATIONWIDE GASOLINE RATIONING
PLEASURE DRIVING BAN
PLEASURE DRIVING BAN LIFTED
PLEASURE DRIVING BAN RESTORED
PLEASURE DRIVING BAN LIFTED
SPEED LIMIT CHANGED FROM 35 TO 40 M.P.H.
STRICT ENFORCEMENT OF SPEED ORDERED
GASOLINE RATIONING ENDS

PERCENTAGE OF ALL TRAFFIC TRAVELING OVER 35 AND 40 MILES PER HOUR


PERCENT
PERCENTAGE OF ALL VEHICLES EXCEEDING 35 M.P.H.
PERCENTAGE OF ALL VEHICLES EXCEEDING 40 M.P.H.
N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J
1942
1943
1944
1945
1946
NATIONWIDE GASOLINE RATIONING
PLEASURE DRIVING BAN
PLEASURE DRIVING BAN LIFTED
PLEASURE DRIVING BAN RESTORED
PLEASURE DRIVING BAN LIFTED
SPEED LIMIT CHANGED FROM 35 TO 40 M.P.H.
STRICT ENFORCEMENT OF SPEED ORDERED
GASOLINE RATIONING ENDS

DIVISION OF HIGHWAY CONTROL
TRAFFIC ENGINEERING SECTION
CONN. STATE HIGHWAY DEPT.


ACCIDENTS REPORTED
YEAR 1944
27.3 %
72.7 %
16,617
ON STATE HIGHWAYS
ON OTHER ROADS
YEAR 1945
30.6 %
69.4 %
22450
ON STATE HIGHWAYS
ON OTHER ROADS
YEAR 1946
(6 MONTHS)
38.9 %
61.1 %
11638
ON STATE HIGHWAYS
ON OTHER ROADS
ANTICIPATED ACCIDENTS FOR 1946
40.0%
60.0%
25860
ON STATE HIGHWAYS
ON OTHER ROADS
ACCIDENTS ON STATE HIGHWAYS BY MONTHS
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEP. OCT. NOV. DEC.
1000
900
800
700
600
500
400
300
200
100
0
NUMBER OF ACCIDENTS
1946
1945
1944

in the 1945 National Safety Contest. In notifying Commissioner Cox that Connecticut had won the eastern states award for 1945, H. Russell Tryon, Field Representative of the Highway Safety Commission, stated--

"Our State has the enviable record of winning this award four years in succession in addition to two Grand Awards and three awards of Honorable Mention since 1937.

"The credit for this fine record is due to many agencies but we feel that the efforts of the Highway Department have contributed a major share.

"I can say without fear of contradiction that the report and exhibits submitted by your department under the guidance of Mr. W. Howard Sharp, was the best of many good reports submitted in the past years and the finest report submitted by any department for the 1945 Contest."

A report on Traffic Engineering for the President's Highway Safety Conference in May, 1946, included as its only appendix the comparative accident experience on the Merritt Parkway and Route US 1 in Connecticut.

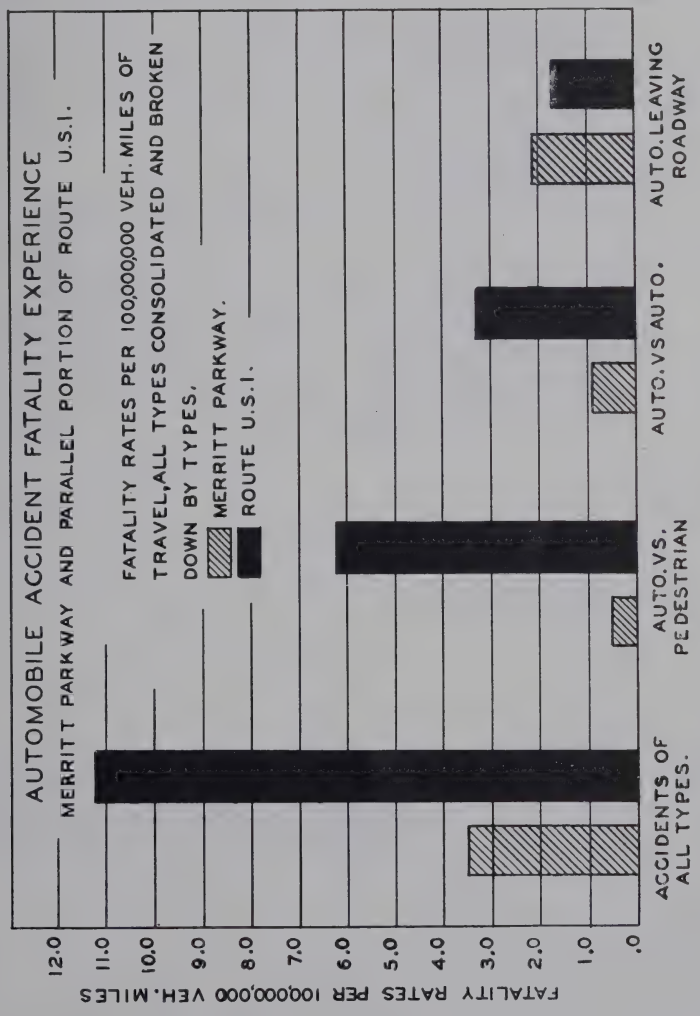
The comparative accident experience material was prepared by the Traffic Engineering Section and the committee reporting to the President cited it as an unusual opportunity to compare the hazards and characteristics of a modern four-lane express road with those of an earlier conventional four-lane road. The value of the accident analysis activity of the Traffic Engineering Section can readily be established when such a report could be used by the Engineering Committee of the President's Highway Safety Conference which was represented by the most capable traffic engineers in the country.

As of July, 1946, the Traffic Engineering Section had compiled a six-year record of all accidents occurring on the state highway system. Intensive analysis of accidents by close scrutiny of accident reports and special accident investigations is necessary to develop more definite knowledge concerning the elements of highway design and construction which enter as causative factors. The value of this record which is being kept on a current yearly basis cannot be underestimated when one considers the data available to determine high accident locations will provide safer highways and highways free from undue congestion. Analysis of the accident records reveals many of the inadequacies of our older highways such as insufficient super-elevation on curves, restricted sight distances, short turning radii, pavement surface condition, roadway widths (restricted due to parking), adverse cross-slope of pavement, lack of highway illumination, or poorly-timed traffic signals. Other supporting evidence as to the value of the accident analysis may be found in the report on "Highway Fatalities" for 1944. This showed that 47.3 per cent of all fatalities were pedestrian accidents, which indicated need for a concentrated effort to provide some control for pedestrians on the state highways. The Traffic Engineering Section also found that from 1940 through 1944, only 0.6 per cent of all accidents on the state

system could be attributed to a defective condition of the highway. Continuing study of the accident experience on these lines is necessary to insure the highest efficiency in roadway maintenance to reduce the accident potential.

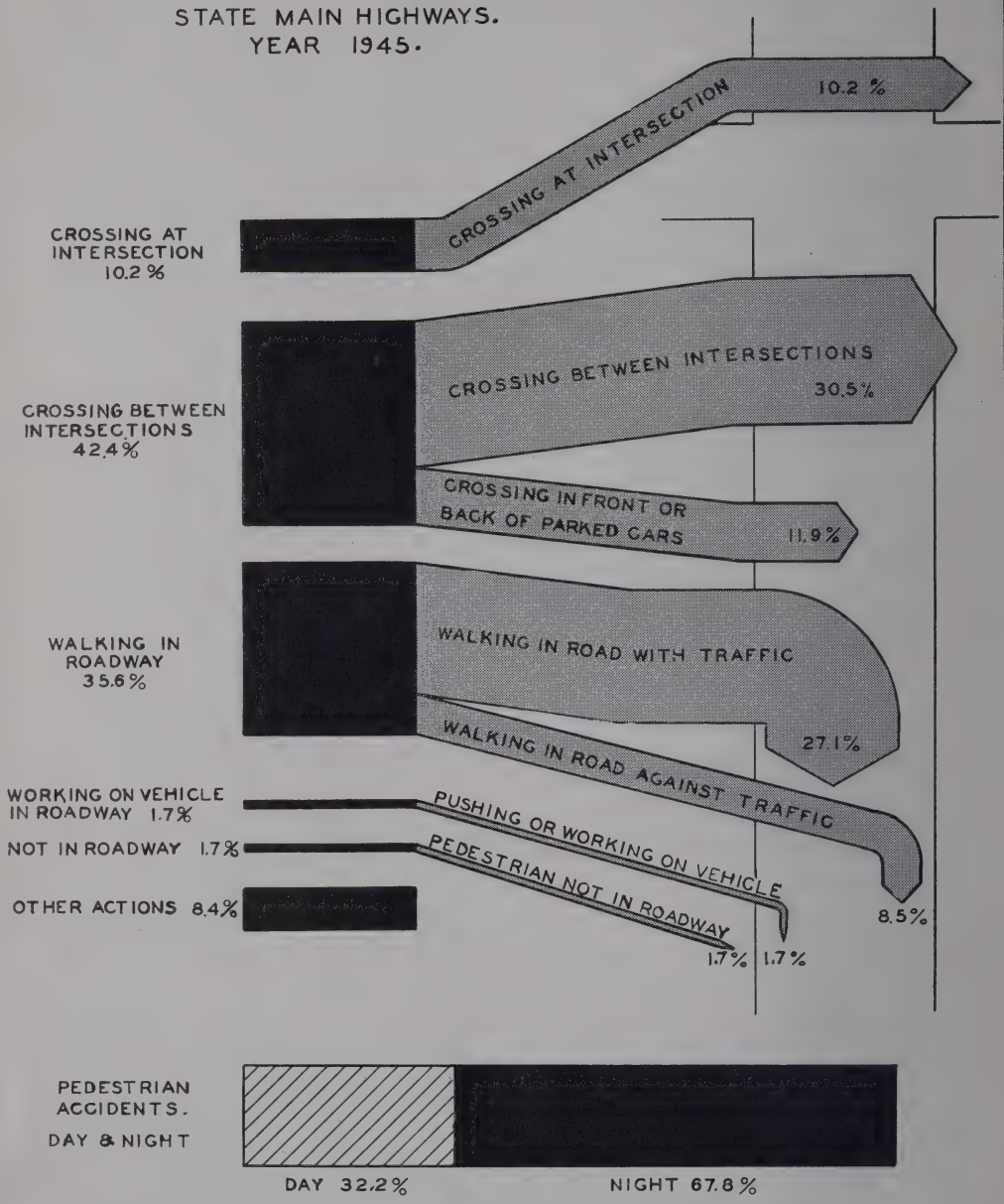
In March, 1946, the section submitted a complete study and analysis of nighttime accidents which would be a fundamental element upon which the Commissioner may establish a policy for highway illumination.

Since November, 1942, the section has conducted bi-monthly speed checks at critical points on the state system where a cross-section of traffic could be observed. In March, 1944, as the result of an analysis of these records, the State Traffic Commission recommended that



HOW PEDESTRIAN FATAL ACCIDENTS OCCUR.

STATE MAIN HIGHWAYS.
YEAR 1945.


CROSSING AT INTERSECTION 10.2 %
CROSSING AT INTERSECTION 10.2 %
CROSSING BETWEEN INTERSECTIONS 42.4%
CROSSING BETWEEN INTERSECTIONS 30.5%
CROSSING IN FRONT OR BACK OF PARKED CARS 11.9%
WALKING IN ROADWAY 35.6%
WALKING IN ROAD WITH TRAFFIC 27.1%
WALKING IN ROAD AGAINST TRAFFIC 8.5%
WORKING ON VEHICLE IN ROADWAY 1.7%
NOT IN ROADWAY 1.7%
PUSHING OR WORKING ON VEHICLE 1.7%
PEDESTRIAN NOT IN ROADWAY 1.7%
OTHER ACTIONS 8.4%
PEDESTRIAN ACCIDENTS. DAY & NIGHT
DAY 32.2%
NIGHT 67.8%

the war-time speed of 35 mph as suggested by the Office of Defense Transportation be increased to 40 mph. At that time, the record showed that 75 per cent of the traffic was traveling in excess of the 35 mile limit, that the accident experience in 1943 was low, and indicated that an increase to 40 mph was advisable. In December, 1944, the Traffic Engineering Section was requested by the State Traffic Commission to make an engineering study to determine reasonable speed zones on a typical section of state highway. The location chosen was Route 10 from Southington to Hamden, a distance of 12 miles, and the report based on the study has had considerable attention from traffic authorities throughout the country.

Hazardous Locations—During the biennium nearly 400 investigations were made on the state system where complaints charged that hazardous conditions existed. Recommendations ranged from relocating a particular warning sign or opening a restricted sightline to the proposal that a major construction project involving extensive channelization be carried out. Principal projects included an improvement of the adverse cross-slope condition on Route US 6 at the intersection of Route 97 in the town of Hampton and improvement of the cross-slope on Route US 1 at Neck Road in the town of Madison. Surveys were made at several locations to determine the necessity for sidewalks. This type of survey is particularly important since with heavy pedestrian traffic, it is possible that construction of sidewalks might relieve a serious traffic hazard. Sidewalk surveys were conducted in Durham, Saybrook, Plainfield, Windsor, Somers, Thompson, Stratford and Avon.

A typical case may be cited at the curve on Route 123 in the town of New Canaan. The sharp curve at the intersection of Canoe Hill Road had been the scene of seven accidents in which two persons were killed, seven persons injured and property damage reached $1,790. The cause of these accidents was apparently excessive speed with the operator unable to negotiate the curve. These all occurred between 1:30 and 4:30 A. M. and it was apparent that at night the existing warning signs did not convey the intent to slow traffic approaching the curve. Roadway delineation was recommended and a careful installation of Scotchlite reflectors was provided in March, 1945. No further accidents have resulted.

Through Routes—During the biennium, agreements were negotiated with the cities of New Haven, Norwich, Middletown, Bridgeport and New London to lay out and mark through routes on the town-maintained highway within city limits. A symbolic shield for the Merritt Parkway Commission was designed and all approaches to the Merritt Parkway from Route US 1 were marked.

Parking—Approximately 250 investigations were made at the request of town or city traffic authorities to detrmine and recommend to the State Traffic Commission that restricted parking areas be established. It is felt desirable that close contact be maintained with

town traffic authorities so that restricted parking zones will be established to the best interest of all parties to insure a smoother safer flow of traffic. Studies were conducted in Windsor and Wethersfield to determine the requirements and advisability for off-street parking. Surveys of this type, in conjunction with proposed business developments, are necessary to prevent possible congestion and hazard on state highways.

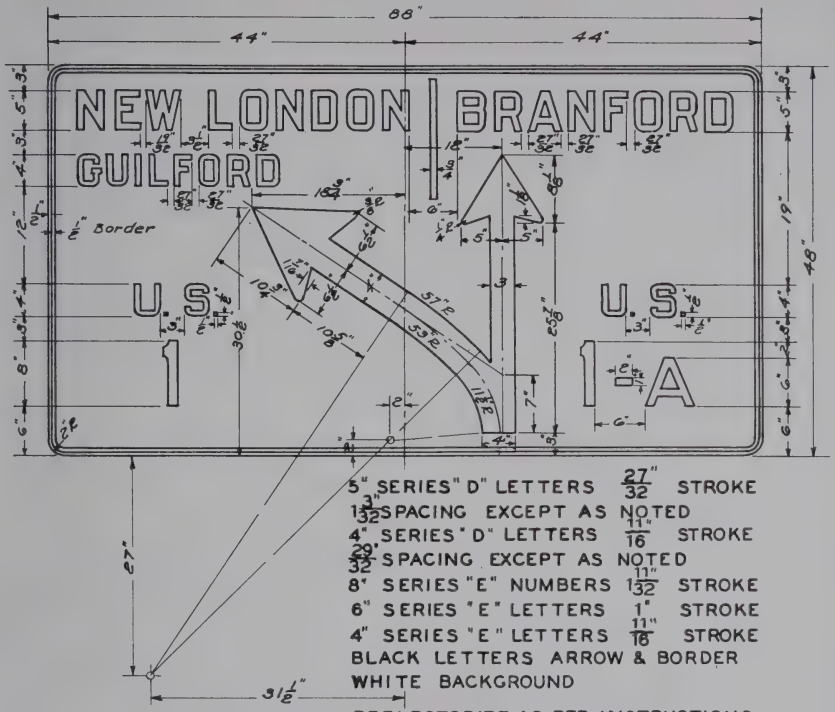
Signalization—Approximately 25 studies were made at various locations on the state system to determine the necessity for traffic signal lights, and if so, to recommend the appropriate type. Heretofore, it has been a more or less general policy to grant these permits promiscuously. Through the endeavors of the section, definite need for the traffic signal must be established before a recommendation is made that a permit be granted.

Speed Zoning—During the biennium, approximately 90 locations on the state system were surveyed and appropriate speed limits recommended to the State Traffic Commission. Requests for speed zoning from the town traffic authorities have increased greatly, and it is probable that a considerable portion of the time of the Traffic Engineering Section will be spent on speed zoning the state highways during the next biennium.

Design of Signs—The section has designed approximately 135 special type signs besides furnishing detailed drawings of all standard warning, directional, and informatory signs. Considerable time has been devoted to improving the designs of warning and destination signs as it is realized the effectiveness and usefulness of the highway are increased by the presence of appropriate signs. Signs with enlarged letters or symbols have been designed to fit particular locations where experience has taught that standard signs do not provide necessary information. At the Hartford exit from the Charter Oak Bridge a sign was designed to give the motorist sufficient warning of the sharp right-hand turn and permit him to make the maneuver comfortably. A metal sign with blue background and white letters was made, the lettering being illuminated by neon tubing. Its effectiveness has been proven by the smooth flow of traffic and absence of accidents.

Accident Claims—During the biennium, 92 claims for injuries and damage to personal property were filed against the State Highway Commissioner that were due to alleged defects in the highways. Investigation of these claims made by the section consisted of field surveys, photographs, a report of conditions and preparation of maps for court action. About a dozen cases were tried which required that maps be presented and witnesses from the Traffic Engineering Section testify regarding conditions of the highway.

Bus Routes—The section has spervised a survey of all bus routes in the State of Connecticut in conjunction with the Public Utilities Commission and the Tax Department. The mileage of all bus routes



5" SERIES "D" LETTERS $\frac{27}{32}$" STROKE
1 3/32" SPACING EXCEPT AS NOTED
4" SERIES "D" LETTERS $\frac{11}{16}$" STROKE
$\frac{29}{32}$" SPACING EXCEPT AS NOTED
8" SERIES "E" NUMBERS $\frac{11}{32}$" STROKE
6" SERIES "E" LETTERS 1" STROKE
4" SERIES "E" LETTERS $\frac{11}{16}$" STROKE
BLACK LETTERS ARROW & BORDER
WHITE BACKGROUND
REFLECTORIZE AS PER INSTRUCTIONS

SPECIAL DIRECTIONAL SIGN

SCALE 1"= 1' MADE BY S.L. DATE 2-7-45
TRAFFIC ENGINEERING SECTION

was measured and segregated into two types, one accumulated mileage of bus routes on state highway, the other accumulated mileage of bus routes on town-maintained highways. These figures were used by the Tax Department in refunding to the towns or allocating to the highway fund at a rate per mile of route the amounts paid to the state by the operators of the bus lines who are assessed on a mileage basis. It is thought that the highway department will benefit to the extent of approximately $35,000 annually as a result of this survey.

During the next biennium, it must be assumed that traffic volumes will be greatly increased and that speeds will also be much higher than in the past. Vehicles from six to ten years old, whose owners have been reluctant to part with them despite probable mechanical deficiencies will occupy these highways along with new and modern-built cars. If the Traffic Engineering Section is to maintain its efficiency in the light of these factors, it will probably be well to consider a finding of the committee on engineering for the President's Highway Safety Conference, which reads:

"If highway traffic safety is to attain its maximum benefits through engineering measures, engineers must be trained, given experience through well organized in-service training, and placed in responsible positions at key points in organizations with reasonable assurance that they may find an opportunity to pursue their professional careers with compensation commensurate with their ability and experience and with assurance of continuity in the tenure of their positions."

Highway Signing—The Highway Marking Section has carried on its regular highway signing work from five sign districts located in Hartford, Norwich, Bethel, Willington and Winsted. During the period of time covered by this report there were erected a total of 49,000 signs. These signs were all manufactured of one-half inch plywood using Scotchlite as the reflecting element. During the period covered by the previous biennial report there were a total of 36,000 signs erected. The 36.1 per cent increase during the past two years was partly due to using the line painters on sign work during the winter months when it was impossible to do their regular work, and better work scheduling in the districts having completed inventories.

A survey was made of the cost of signs manufactured by the Wethersfield State Prison, and by making changes in manufacturing procedures and materials used the cost was reduced by 20 per cent. The material changes involved the use of plywood instead of three-quarter inch pine boards, and Scotchlite instead of reflector buttons. These changes reduced to a great extent the manufacturing operations on a sign.

The sign inventory being conducted by the Highway Marking Section has been discontinued for the time being because it is not possible to secure materials for signs to keep pace with the inventory work. Previous to the discontinuance of this work, the inventory was approximately 75 per cent completed and it has been estimated

that 5,000 signs have been eliminated from the state system by this work. We feel that the elimination of these signs has not only reduced the cost of sign maintenance but has enhanced the value of those remaining and increased the safety of the motoring public. Although many signs have been removed from the field, we have received no complaints from the public on lack of adequate signing.

At present the section is experimenting with metal to replace plywood. This was brought about through the inability of the Wethersfield State Prison to secure plywood. This will, of course, result in about a 33 per cent increase in the cost of the finished sign, but it may show over a period of time to be as inexpensive as plywood. The metal signs are not subject to deterioration through exposure, and they can also be returned to the manufacturer for repainting and reconditioning to restore the original appearance.

Pavement Markings—During the past two years the pavement marking crews have painted 4,602 miles of center line, including solid and skip lines.

We have experienced considerable difficulty in obtaining white traffic paint, and in November 1945 there were 22,000 gallons requested so as to be able to complete our painting season. To date we have received 3,000 gallons of this paint, and it appears at present that we will be unable to paint all secondary roads as previously done.

Experimental work is being carried on with two types of reflectorized paint for center lines to determine the one most suitable from the standpoint of reflective value and wearing qualities. We have several installations throughout the State located on Route U. S. 44 in the towns of West Hartford and Avon, Route Conn. 15 town of Glastonbury, Route U. S. 5 town of Wallingford, and Route Conn. 10 town of Southington. The public has reacted very favorably to this paint, and we will undoubtedly receive requests for its use at locations where greater safety measures are needed and cannot be obtained with the present non-reflecting paint.

We have also painted by hand during the past two years 5,373 sets of stop bars, 185 traffic circles, and striped 75 bridge and underpass abutments. We have also made a practice during the winter months to carry on a highway delineation program and during the past two years have delineated 68 sections of road throughout the state.

A new type rounded letter for use on all highway signs bearing legends will replace the former square type lettering which required more room and cut down the legible distance due to the number of parallel vertical strokes in close proximity.

Regular maintenance work on state maintained traffic lights, flashing beacons and illuminated signs has become a routine function.

Permits—The Permit Section issued a total of 14,575 permits during the biennium. This total was made up of 6,684 permits for the transportation of vehicles and loads in excess of the normal legal limits, 2,607 for excavations within the State Highway rights of way

for the installation and repair of underground utility services, 1,214 for the replacement and extension of utility pole lines, 1,127 for the construction of driveway entrances and grading within the state highway rights of way, 280 for the erection of privately-owned signs, 598 for planting, trimming and removal of trees and shrubbery within the state highway areas, 120 for the replacement and construction of sidewalks, steps, and curbings, and 28 for allowing obstructions to be placed within the state highway area for short periods of time during construction work carried on by private individuals.

Of the 6,684 permits issued for the transportation of vehicles and loads in excess of legal limits, 500 were for use on oversize vehicles acquired by private contractors during the war. Rather than rule these vehicles off the road, it was felt that an exception should be made for their use under permit from the State Highway Commissioner until May 1, 1947.

During the fiscal years ending June 30, 1943 and June 30, 1944, the section issued a total of 14,222 permits as compared with 14,575 during the fiscal years ending June 30, 1945 and June 30, 1946, the biennium covered by this report, showing an increase in work of only 2.48 per cent. However, in order to show the increase in the amount of work in the section a comparison is made between the last twelve months of the period covered by the previous biennial report and the last twelve months of the period covered by this report. During the first period mentioned a total of 5,132 permits were issued as compared with 8,777 permits issued during the latter period. This shows an increase of 72.9 per cent and gives an indication of the tremendous increase in work by contractors and utility companies over that performed during the war years. We have been able to keep abreast with this new work as the former employees of the Permit Section in the Armed Forces have returned.

BUREAU OF ROADSIDE DEVELOPMENT

By JOHN L. WRIGHT, *Director*

During the first year of the biennium the Bureau of Roadside Development operated on much the same levels as in the preceding war years. Extreme shortage of manpower, and the necessity to conserve badly worn and irreplaceable equipment made it most difficult to perform the delegated activities of roadside development and maintenance. Despite these obstacles it was possible to complete basic stabilization work on the slopes and other roadside areas on several miles of newly constructed highways and to maintain the roadsides at standards that insured safety of war time traffic and conservation of investments already made in roadsides.

At the end of the war early in the second year of the biennium, a gradual stepping up of bureau activities was necessary to keep pace with increased traffic resulting from the easing of restrictions on gasoline and tires.

As quickly as seasonal limitations would allow, the program planned for the post war period got under way. Contrary to the general expectations manpower and equipment shortage continued through the year with but slight improvement. However, a good share of the development work scheduled for this year was completed as follows:

1. The major portions of the plantings on the approaches to the Charter Oak Bridge and to the New London-Groton Bridge were installed.

2. The annual shade tree planting — omitted during the war years—was resumed. This program is designed to replace those trees which of necessity are removed to insure the safety of the highways, as well as to establish tree belts as required along newly constructed roads.

3. The roadsides on several construction jobs completed within the year were stabilized and developed.

4. Numerous landscape projects were executed under property agreements in connection with the purchase of rights of way.

5. Complete landscape development of the grounds at the Governor's Residence was carried out by the bureau forces.

In addition to the foregoing development program there were numerous roadside maintenance activities which had to be carried on, as follows:

1. Care of the shade trees consisting of careful pruning, bracing, and cabling of weakened limbs, spraying of the elm trees, and fertilizing. The care of shade trees along the highways is most worth while. Not only does it promote safety to the traveling public but adds immeasurably to the health and appearance of the trees. The roadside tree population is a valuable asset to the highway system and deserves careful consideration.

The rapid spread of the Dutch Elm disease throughout a greater portion of the State has necessistated the removal of a considerable number of infected trees. Every effort has been and is still being made to prevent the spread of this dreaded disease to the healthy trees. It is hoped that a fair percentage of the elms will prove to be immune to this infection.

2. With the end of the war more extensive removal of roadside sprout growth was immediately essential to open up the sight distance for the safe passage of the increased flow of traffic. Although a considerable amount of this clearance has been accomplished this year, continued efforts toward further sight line clearance is planned.

3. There are over 140 picnic areas located throughout the Highway system. During the war years over 40 per cent of these picnic spots were closed. Only those within reasonable distances from the larger population centers were maintained to afford an opportunity for rest and recreation to war workers. With the resumption of normal traffic all of the areas have been opened in season.

These wayside areas have become increasingly popular. They afford rest and convenience to the motoring public, and materially aid in promoting safety by providing suitable parking space off the traveled roadway. Beyond a doubt this popularity can be attributed in a large measure to the careful maintenance they receive. Without proper and frequent policing the public would very soon cease to patronize them.

4. The mowing of the roadsides is an essential duty of the bureau. It aids in preventing the restriction of sight lines and clogging of drainage ditches. It also reduces the fire hazard and adds greatly to the attractiveness of the roadsides. During the biennium the same reduced mowing operations were carried out as in the preceding war years. More extensive mowing comparable to pre-war standards is planned for the future.

During the past mowing season the bureau personnel developed a rake attachment for a tractor mower which makes it possible for a tractor operator to mow and rake in one operation. This attachment will most efficiently rake whatever and wherever the tractor can mow. When materials are again available to produce these rakes, it is planned to equip each tractor mower with one.

With these attachments it will be possible to eliminate much laborious and costly hand raking.

5. Grub proofing of median strips was undertaken on divided highways. Japanese beetle grub infestations during the past few years have spread throughout the median strips of practically all divided highways, causing extensive damage to the turf of these areas.

At the advice and with the full cooperation of the State Entomologist during the spring of 1946 approximately 60 miles of median strips were grub proofed.

Subsequent investigations made by the State Entomologist discosed that grub proofing had practically eliminated the grub population in median strip turf.

It is estimated that the materials used in this operation will effectively prevent re-infestations for at least five years.

In line with department policy the Bureau of Roadside Development has cooperated with other state departments whenever possible. On various occasions, at the request of the Supervisor of Purchases, trucks were furnished to transport commodities to the State Prison in Wethersfield and to several of the other state institutions.

Frequently, at the request of the Comptroller, advice and aid were furnished in connection with the maintenance of the grounds at the Governor's Residence.

The Disabled War Veterans' Fishing Area, located on the Black Ledge River in the town of Marlborough, was designed and developed by this bureau for the Fish and Game Commission.

At several other locations, driveways and parking areas were installed for the same commission.

Liberty Grove picnic area in Milford (upper photo), and tractor-mower-rake at work on State Highway roadside.

BUREAU OF HIGHWAY BOUNDARIES AND RIGHTS OF WAY

By EDWARD F. HARRIS, *Acting Engineer of Rights of Way*

This bureau has experienced an increased activity preparatory for post-war construction projects without an increase in personnel except in the second year when the Division of Highway Boundaries was expanded to near its normal complement of employees.

We have operated during the last war years and the post-war period with the usual attendant difficulties arising from the unstable labor conditions and the conditions of the real estate market.

The roster of employees for the bureau as of July 1, 1944 numbered 45, and as of June 30, 1946 the number had increased to 62 as against a normal force before the war of 82 employees.

The reorganization of the bureau as started in 1943-44 has gone forward and been made permanent. It is felt that the system now in effect will, with use and adjustments from time to time, prove satisfactory.

Boundary Surveys. The Division of Boundary Surveys has, for many years, had as its principal function the reestablishment of lost and uncertain highway boundaries as prescribed by various statutes. During recent years, prior to the entry of this country into World War II, this division, in addition to the boundary reestablishment program, has been responsible for monumenting and mapping the boundaries of all properties acquired by the State in connection with state aid, trunk line and parkway construction.

Engineering services required in connection with title examination, property appraisals and property acquisition, have also been rendered, these services having been continued during the war when all regular boundary surveying was curtailed.

On June 30, 1945, the salaried personnel of the division numbered 10 of a normal force of 52. On September 1, 1945, the New Milford office, which had been closed since December, 1943, reopened with a minimum staff of three men. The staffs of the Hartford, New Haven, and Norwich offices were increased to a minimum degree, and boundary work was resumed to a limited extent. During the fiscal year, which closed on June 30, 1946, on which date the number of salaried personnel on duty totaled 24, the four boundary survey units have furnished engineering services to the bureau as required and have made some progress toward resumption of routine functions when allocation of funds will permit the reemployment of former members and the filling of vacant positions.

Our records for the fiscal year 1945-1946 disclose that the four unit offices have completed 285 assignments indirectly related to highway boundary establishment, including requests for highway line data received by us from the public, surveys and maps required by the department in connection with both the acquisition of rights of way and the disposal of surplus real properties, surveys and maps of areas ac-

quired by the department for use in conjunction with highway maintenance, and surveys and maps prepared for other State agencies. The division has also furnished personal services for carrying out of such field activity of the Connecticut Geodetic Survey as conditions have necessitated and permitted.

Titles and Records. This division is composed of 16 employees representing the full or normal force required to meet the demands of the present war program. During the emergency and since, the work has been carried on without too great difficulties since the force was and we expect will remain ample to meet the demands of the regular program.

The work on title examination of properties on the proposed Fairfield County Relief Highway has been continued in order that the material be available for our work in the future. This route, extending across Fairfield County, involves several hundred properties in each town, and a continuation of this work will we feel justify itself when the project is finally concluded.

Right of Way Purchases. This division is continuing to operate with the same number of employees as during the war and has been able to prepare programmed post-war projects for construction.

The entire Wilbur Cross Highway right of way has been secured and we are engaged in the acquisition of rights from abutting property owners to control the access on the section constructed several years ago. With the completion of the acquisition of these rights the highway will then be non-access or limited access throughout its length.

At present we are negotiating for acquisition of rights to control access to the part of Route No. U. S. 1 or the New London By-Pass from Golden Spur in East Lyme to the new Thames River Bridge.

Several other projected highway improvements, scheduled to be included in a system of controlled access are now in the process of appraisal.

This division's chief objective to purchase and clear necessary rights of way for post-war construction has naturally encountered considerable difficulty, due to the housing, labor and material shortages. In instances, where the owner was permitted to occupy the premises, rent and time for such occupancy was a negotiable factor. In all instances where conditions were such that a dwelling could be moved, arrangements were made to so proceed. These arrangements met with difficulties in securing movers with enough labor and material with which to rehabilitate the building. In spite of these difficulties, by careful planning, close cooperation and consideration for the owners the necessary properties have been acquired and the public reasonably well satisfied. This has not, however, been accomplished entirely without criticism from some sources.

We were fortunate in the rural districts through which the Wilbur Cross Parkway passes in the Vernon and Tolland sections that the inflated real estate prices had not, at the time of purchase, reached

this area. Through the thickly settled urban areas the opposite was true, and we were compelled to pay prices far in excess of pre-war values. There has been no change in the personnel of the negotiators, all of whom have had years of experience in this work, and what measure of success this division has had is largely due to the experience, knowledge, skill and tact of these men in dealing with the public during this trying period.

In acquisitions by condemnation, the court verdicts have, in the main, increased the damage award set up in the condemnation. This is interpreted as another example of the unsettled condition of the real estate market, which will probably be corrected when the purchasing value of a dollar, reflected in real estate, again reaches a normal level.

The following is a tabulated summary of the commitments and purchases during this biennium:

July 1, 1944—June 30, 1945	346	for	$518,686.87
July 1, 1945—June 30, 1946	279	for	348,755.05
Total	625	for	$867,441.92

Of the above number 99 cases involved awards in excess of $1,000, totaling $539,054.30 which were all approved by a state referee as required by statute.

In addition to the commitments and purchases listed above, 39 condemnations instituted prior to July 1, 1944 were for a total of $70,802.79.

We have noted by comparison with statistics of purchases in preceding periods that the present average cost per parcel is higher and that there have been fewer parcels purchased. This is largely due to the trend of developing more roads in urban areas as well as unsettled conditions of the market.

Appraisal Section. This section has furnished appraisals on nearly all property acquired for construction projects and all properties acquired in an amount exceeding one thousand dollars or by compulsory process. In addition it has prepared factual and opinion matter for presentation before the courts. It has also furnished considerable data to other sections of the department in the way of estimates of property costs on proposed roads on alternate locations.

This section has been confronted with an especially confusing situation in regard to the property price rise induced by the demand for residential property as further magnified by the increased cost of labor and material. It has devised a replacement costs estimation method which has proved of great value in current property price estimates.

In connection with the projected system of controlled access highways which has been planned we have a new angle to consider in the right of way costs which are bound to be increasingly important and a critical factor in our plans. To meet this, the Appraisal Section will be required to render service of greatly increased scope.

Real Property Disposal. The disposal of surplus real estate has continued with increased activity. In this period 113 individuals have purchased excess highway area with a total return to the state of $65,566.13. The greater number of the areas involved in these transactions were isolated parcels outside the normal width of right of way and were not usable or suitable for either highway development or highway improvement.

Connecticut Geodetic Survey. Section 336h of the 1945 Supplement to the General Statutes, enacted upon July 20, 1945, provides that the Connecticut Geodetic Survey, therein defined as "The Connecticut Coordinate System", be completed and maintained by the State Highway Commissioner.

This survey, upon which work was begun as a federal relief project in November, 1933, has as its purpose the establishment of a plane coordinate system, based upon the triangulation and traverse system of the United States Coast and Geodetic Survey, to which land surveys in the State of Connecticut may be permanently referenced. This type of survey, by means of which all surveys connected with it thereby become positively related, one to the other, has long been recognized by the engineering and surveying profession as most highly desirable and essential to the stabilization of property boundaries. The action of the state legislature in authorizing the completion and maintenance of the Connecticut Geodetic Survey will prove beneficial to property owners and surveyors throughout the state.

During the entire period in which the Connecticut Geodetic Survey was in progress as a federal project, the State Highway Department acted as a co-sponsor and, from 1938 to late 1942, sole sponsor. On November 30, 1942, the survey was assigned to this bureau. Shortly thereafter all activities of the survey were suspended for the duration of the war. One of the key personnel has been retained during the fiscal years ending June 30, 1945 and June 30, 1946, and, from headquarters located in the New Haven residency, has continued the computations incidental to triangulation and traverse adjustment in that portion of the state which lies westerly of the Connecticut River. Between September 1, 1945 and June 30, 1946, the Division of Boundary Surveys has performed some field work essential to the final adjustment of the system. Personnel and financial limitations have kept this phase of the work to an absolute minimum, total expenditures for the two fiscal years, 1944-45 and 1945-1946, having been $2,795.60 and $3,330.27, respectively.

Present plans call for the completion of the Connecticut Geodetic Survey by personnel of the Division of Boundary Surveys working under the direction of members of the department trained and experienced in this type of surveying. The combining of boundary surveying with the completion, maintenance, and extension of the Connecticut Geodetic Survey promises to be the means of insuring the proper standards of accuracy in the boundary surveys and offers what appears to be the most economical manner in which to carry out the instructions of the state legislature. It is hoped that the resumption,

on a full scale, of the boundary establishment program early in the future will permit the completion of the Geodetic Survey and the presentation to the public of the Connecticut Coordinate System.

BUREAU OF STATE AND TOWN AID

By W. E. HULSE, *State Aid Agent*

Since V. J. day did not occur until the biennium was more than half elapsed the activities of the bureau have been considerably curtailed. Shortage of labor and materials as well as Federal regulations have made it impossible to construct any considerable mileage of Town Aid roads and as a consequence rather large balances of Town Aid funds allocated by agreements for road construction have accumulated. It was expected that the expenditure of these funds would act as a cushion to afford needed employment after the ending of the war and until large scale construction could be gotten under way. This has not been the case and we are still experiencing difficulty in awarding contracts. Construction costs have advanced from 50 to 100 per cent and in some instances even more above the 1942 costs so that in many instances it was deemed to be to the best interest of all concerned to reject bids which had been received, also there have been a number of projects advertised for which no bids were received.

In a comparatively few cases we have been able to construct roads using town forces, however, in all of these instances the projects were short sections of light construction which did not require special skill, and for the most part no bridges or similar structures were involved.

This reduction in new construction has been reflected in our maintenance program which has been carried on with a minimum of labor.

Our field forces which ordinarily consist of about 34 inspectors was reduced in 1944-45 to 22 and in 1945-46 to 24.

Ordinary maintenance was carried on only to the extent necessary to conserve the State's investment in the roads already constructed and to keep them in reasonably good repair. It was possible to accomplish very little in the way of maintenance betterments although since V. J. day we have been able to accomplish more in this line. This work consists principally of drainage installation to correct areas affected by frost heaves and the elimination of conditions which permitted surface water to collect on the road or in adjacent areas which in the winter freezes and constitutes a traffic hazard.

In those communities where labor was available we have undertaken some light construction and reconstruction also armorcoating to a limited extent. During the biennium we have thus treated 128.45 miles, about 25 per cent of normal, working in 26 towns.

It was found necessary to repair a great many bridges which ordinarily would have been replaced but because of conditions such construction has of necessity been deferred. It became imperative that the old structures be kept in serviceable condition. Considerable

difficulty has been experienced in obtaining even the small amount of material needed for repairs. However we have succeeded in every instance to keep the bridges open to traffic.

The 1945 Legislature made no important changes in the laws relating to the funds administered by this bureau or which affect its operation and the usual agreements with the several towns have been completed.

The unimproved road mileage as of December 1, 1944 was 3235.2 a reduction of 604.1 miles since the previous report. This reduction is largely the result of a re-appraisal made at the time of the last inventory and therefore does not indicate that this mileage has been improved since the last report. In several instances towns have withdrawn from their unimproved list, roads which apparently will not or should not be improved, at least in the immediate future.

A new inventory is now being taken and will doubtless indicate a further reduction, although in some instances towns have accepted additional roads which will be added to their inventories.

Unimproved road funds have now been available for five years and town aid funds for 16 years and these have been devoted to constructing and maintaining roads which it is not the duty of the Highway Commissioner to maintain.

It is becoming increasingly apparent that the necessity for additional road improvement is being rapidly met and will be greatly lessened, when the existing back-log of funds available for construction has been converted into improved roads.

We know of no state which has improved as great a percentage of its total miles as Connecticut, where we now have all but approximately twenty-five per cent of the total road mileage available for travel at all seasons.

It would appear, therefore, that after our present rural road funds now available for construction have been expended, there will remain only about fifteen per cent of the mileage yet to be improved. Obviously, much of this mileage has little, if any, economic value, and it is doubtful if it should be improved within the foreseeable future.

We feel that very soon some communities may be requesting the improvement of roads, not because such improvement is economically or socially justifiable, but because the funds are available.

This does not indicate that the necessity for improvement of farm to market roads has been entirely met. There are many miles of unimproved roads yet to be constructed which can be fully justified. Rather, it indicates the need for a reallocation of the present appropriations, so that these funds may be expended where they will accomplish the greatest good and where the need of such improvements are indicated.

It is realized that in every community, no matter to what degree their roads have been made travelable at all seasons, there will always be opportunities for further improvements such as widening, realignment to improve sight line and reconstruction to higher types of surfaces. But it is doubtful, in many instances, that these can be justified, however desirable they may appear to the local users.

Connecticut is, to a very great extent, "out of the mud", and much of the purpose for which Town Aid and Unimproved Road funds were originally intended, has, or presently will have been, accomplished, and it would seem desirable that some action be taken by the proper authorities to assure that future funds will be expended where the greatest good will result.

The State Aid agent takes this opportunity to express his appreciation of the efforts of the personnel of the bureau and their loyalty and devotion to their tasks during a most trying period.

BUREAU OF BUSINESS ADMINISTRATION

By A. M. WALTERS, *Business Manager*

The Bureau of Business Administration is primarily a service organization designed to assist each operating unit of the department in its individual functions. It is restrictive only to the extent of ensuring compliance with the statutes and executive regulations, and in the administration of the department's budgets.

The Bureau is composed of four Divisions: Accounts and Statistics; Purchases and Stores; Property Control and Miscellaneous Services.

Accounts and Statistics—This division is made up of five subdivisions. The Accounts Section keeps the budgetary, operating and external budget accounts of the department, schedules invoices and other claims for payment, prepares expenditure certificates and commitment lists and produces reports and statements on the various phases of financing. The Claims Section controls, accounts for, bills and collects all moneys due or accruing to the Department. The Statistics Section, as its name implies, analyzes expenditure, engineering, construction, mileage and other data and provides information required for reports and studies. The Tabulating Section makes a mechanical distribution of labor, equipment and material costs and prepares detailed statments of expenditures according to the prescribed classifications. The Budget Section operates the Department's work-order and allotment systems, with particular attention being given to the propriety of each request.

The work of this Division remains fairly constant from year to year and revisions of procedures and methods are infrequent. It may be of interest to report here that the Statistics Section, during the past year, has made a complete inventory of all state highways, both state aid and trunk lines. To accomplish this, reference was made to each original contract from the inception of the department in 1895 to date, together with the construction plans and rights-of-way maps. It included all types of construction from minor drainage or grading projects to parkway construction; complete and accurate statistics are now available concerning state highway mileage in each town of the state by types, whether original construction or reconstruction, the portions discontinued and the resultant net mileage.

Purchases and Stores—This division serves as the purchasing and stores controlling agency of the department. Its subsidiary units are the Purchases Section which processes all material and supply requirements of the Department and all equipment other than office equipment; the Stores Section which records and controls the storing and distribution of the stock of supplies and materials in its several "distribution centers" located throughout the State; and the Portland Plant which is a central receiving depot, a stores distribution center for consumable supplies and materials and also functions as a manufacturing agency for items not generally obtainable from commercial sources.

The biennium, with more than a full year of war and its ensuing transition period, beset this Division with many difficulties. Wartime restrictions, priorities for purchasing, channelling of strategic materials to military use, disappearance of commodities from the market and substitutions of inferior grades required the utmost ingenuity and continual search of the markets. We were extremely fortunate that we entered the war with a well balanced store of supplies and materials. Foresight in its purchase, caution in its withdrawal and use and never-ending search for its replacement enabled the department to maintain its highways without serious disruption.

An indication of the great volume of detail work performed by the Purchases Section may be obtained from the fact that over ten thousand purchase orders were issued during the fiscal year 1945-46. The Stores Section also has had its share of capacity operation under abnormal conditions and it should be noted here that the consolidation and re-organization of the stores facilities during the previous biennium has proved to be of great benefit in controlling the purchasing, handling, storing, issuing and transferring of the thousands of items which make up the Stores inventory.

The Portland Plant has been the object of a minor revision. The so-called Peterson building which has been used for storage purposes has been transferred to a Machine Shop unit of the Division of Property Control. Further, information concerning this new unit is related under the report of that division. The release of this building was enabled by the construction of concrete platforms and ramps at the other storage buildings and the purchase of a power driven lift truck. The unloading of freight cars and trucks is simplified and accelerated and full use of the storage capacity of the various buildings is allowed by the ease of hoisting the materials to any desired height.

Property Control—This division controls the real properties and operating equipment of the department exclusive of highways, bridges, ferries, and equipment on drawbridges. It is now composed of four individual units: the Property Records Section; the Property Inspection Section; the Building Section and the Machine Shop. The latter two were instituted as the biennium ended.

The Property Records Section maintains an inventory record of approximately 20,000 items of property and equipment, fixes depreciation rates and rental charges, and records equipment use, operating costs, and earnings.

The Property Inspection Section is responsible for the inspection and proper maintenance of the Department's equipment, and has jurisdiction over the eleven garage repair shops of the department. This unit was confronted with many problems during the biennium, the greatest of which was the necessity for maintaining our truck equipment in operating condition. It has been our policy, under normal conditions, to trade-in equipment which became unfit for further economical use. The impossibility of obtaining replacement trucks, from the beginning of the war until the end of the biennium, resulted in an accumulation of equipment which must continue to perform heavy work with a minimum of breakdowns. A program of major overhauling was initiated, and through the diligence of the Equipment Inspectors and other personnel in finding and obtaining replacement parts, and the skill of the employees assigned to the repair shops, we were enabled to continue our motor vehicle equipment in most satisfactory operation. This is best illustrated by our experience in handling the abnormal snow falls of the past two winters. The Hartford Weather Bureau reported a total fall of 66.8 inches of snow for the winter of 1944-45 and 79.9 inches in the following winter, 45 inches of which fell in December alone. A total of but 37.6 inches is considered normal for an entire year. Our trucks, carrying heavy loads to increase traction, cleared the highways and shoulders with their usual dispatch, and a share of the credit must be given to those who maintained, repaired and overhauled the equipment.

The Building Section, which has recently been set up as an individual unit, has taken over certain responsibilities previously assigned to the Property Inspection Section and to the Superintendent of Property. The need for adequate equipment storage and repair facilities has long been apparent and has become increasingly so in the past biennium. We have been forced to vacate quarters in strategic locations, and to transfer equipment and personnel elsewhere. A program of building construction to alleviate the most serious conditions has been inaugurated, and the Building Engineer is now working in cooperation with the State Comptroller's Office to effect the erection of equipment storage buildings at Bolton, Meriden and Saybrook, and a storage and equipment repair shop at Norwalk. Others will be added to the program as funds and materials become available. This section is also responsible for the proper maintenance and repair of all of the real assets of the department. Adequate inspections are made and the work programmed and accomplished under the direction of trained personnel. We believe that this new unit will correct a previous deficiency in our organization and prove to be a valuable part of the bureau.

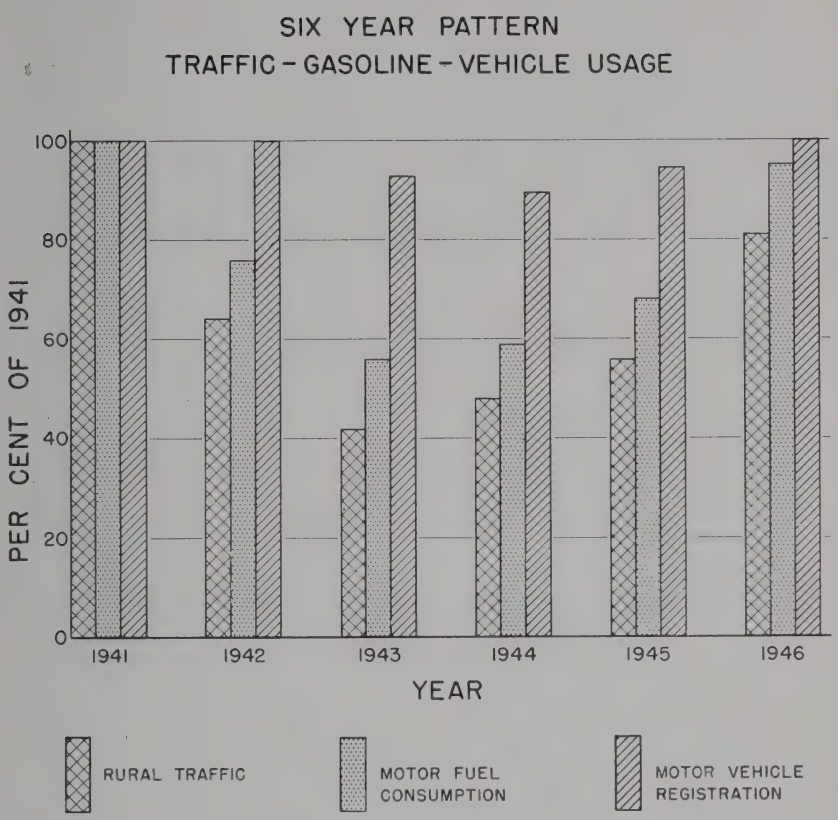
The Machine Shop also is a recently established unit. It is housed in the so-called Peterson building adjacent to the Portland Plant and equipped with machine tools capable of performing practically any type of machine shop work. Its functions will be varied, ranging from standardized installations of equipment to experimental work in the development of specialized highway equipment. As each new

truck is delivered to the Department, it will be routed to the Machine Shop and all special equipment, including snow plow underframes, sanders, etc., and all special accessories, such as blinker lights, installed. Much work previously performed by commercial garages including reboring of motors will be accomplished by the new unit and it is intended to centralize the major overhauling of motors, differentials, transmissions, etc. at the Machine Shop, and relieve the repair garages of this load.

Miscellaneous Services—The Central Files Section, Stenographic Section, Map File and Blue Print Section, Addressograph Section, Mail and Messenger Section and the Greenwich and Milford Toll Stations comprise the Division of Miscellaneous Services. Their functions are indicated by their titles and little need be said of some of them beyond the fact that we are so accustomed to the special services which they furnish to the department that their efforts and activities are often unnoticed.

The Map Files and Blue Print Section and the Addressograph Section, each enjoyed somewhat of a respite during the war because of the curtailment of highway construction work. Since the ending of the war, however, they have been deluged with work necessary for the letting of a large program of deferred construction work. The Blue Print room has averaged over 40,000 blue and black and white prints per month during the past year, and has produced a large quantity of tracing reproductions, photostats and photographs. The Addressograph Section has printed, during the past year, a majority of the forms used by the Department, the monthly publication of "Cuts and Fills" and the many administrative memoranda for general departmental distribution. It prepared the periodic payroll and property lists and mimeographed the many bid and informative sheets required for the contract lettings in our construction program. In addition, it printed the new manuals of organization and procedures for each Bureau of the Department, and the new Standard Specification for Roads, Bridges and Incidental Construction, totalling over 400,000 mimeographed sheets. In each instance the Stenographic Section prepared stencils for the extensive duplicating work.

The Greenwich and Milford Toll Stations reverted to a pre-war basis at the conclusion of hostilities. War-time use of the Parkways by commercial vehicles was terminated and the toll lanes which had been specially reconstructed to accommodate trucks were reconverted to their original design. The rapid increase in traffic caused some concern because of our inability to secure sufficient competent persons for toll collecting duties. This condition was particularly acute at Greenwich which is distant from heavily populated areas. The stations were further handicapped by the failure of several treadles and other automatic counting equipment during the war, when replacements were impossible to obtain. These conditions gradually improved and all toll lanes have been returned to operating condition.



This chart shows the changes experienced since 1941 in three of the factors reflecting the use of roads in Connecticut.

Vehicle registrations in 1942 were the same as in 1941. These were issued before restrictions on motor fuel were first imposed in May, 1942. Consumption for that year was 76 percent of 1941. Gasoline restriction had its greatest effect on rural traffic which was reduced to 64 percent of 1941.

In 1943 only 93 percent of the 1941 total was registered. The rationing of gasoline cut actual fuel use to 56 percent of 1941 and most of that was used in urban centers. This is indicated by rural traffic dropping to 42 percent. Actual consumption was 224 million gallons, the smallest quantity used since 1930 when registration was only 60 percent as large.

In 1944 registrations were at the lowest level, just short of a half-million. Motor fuel and rural traffic indices were up, due to relaxation of some restrictions.

In 1945 with V-J Day following V-E Day, restrictions were lifted but tires and car ages precluded full use.

During 1946 some new cars have helped restore the 1941 registration level and motor fuel use is at 94 percent. Rural travel is still only 81 percent.

BUREAU OF HIGHWAY PLANNING STUDIES

By ROY E. JORGENSEN, *Director*

General—The work of this bureau, which has now been functioning for about four years, is financed to the extent of 50 per cent with Federal aid highway funds as a continuation of the State-wide Highway Planning Survey of 1938-1942. The Federal Highway Act of 1944, like similar bills since 1934, provides that 1.5 per cent of the allocation of funds to each state shall be used in the financing of highway planning or other research activities. Funds under this act cover the three fiscal years ending June 30, 1946, 1947 and 1948.

During the biennium, activities of the bureau have become established with some definiteness. The development of organization and procedure manuals for this and other bureaus was helpful in the integration of the activities with the work of other bureaus. As defined in the manual, the functions of the bureau are: "(1) the collection and current maintenance of statistical data relating to the physical character of the public roads in the State, the financing of their improvement and maintenance, and the use of the public road systems, (2) the interpretation of the data for the use of the Commissioner in establishing financial policies and plans, highway improvements, and priority schedules, and (3) such special studies as may be specifically assigned in view of the extent and character of statistical data the Bureau has developed. The final objective of the Bureau is to assist the Commissioner in the development of a coordinated, factually determined, continuous plan for the development of the state highway system."

With the return in 1946 of unrestricted travel on our highways, extensive traffic counts and traffic studies have been initiated to bring the over-all state traffic picture up to date and to provide a basis for planning future highway construction projects.

Federal Aid Highway Systems—During the biennium the federal aid primary highway system has been revised and there has been established a federal aid secondary system. Action on these was initiated by the state and approval of the Public Roads Administration was obtained.

Revisions to the primary system were made to eliminate some less important routes and to replace them with roads having greater traffic importance. The system now totals 1101 miles, all except 136 miles of which are now state maintained highways.

Recommendations for the secondary system were based first on providing an equitable distribution of mileage between the counties of the State and then of developing a reasonably well integrated system of those roads next in importance to the primary system. Allocation of mileage between the counties was made in proportion to the mileage of rural public roads carrying traffic in excess of 50 vehicles a day and excluding routes on the primary system. Route selections within the counties were based largely on the traffic volume served as deter-

This air view of Middletown shows proposed Express Highway along the Connecticut River which will greatly improve traffic conditions on Main Street, the business area, and at the same time provide adequate exits for those who wish to visit the center.

mined by the state-wide planning survey counts of 1939. Consideration was given, too, to the use of roads by school busses or for rural mail delivery. The secondary system includes 1085 miles of roads, of which 1006 miles are state highways and 79 miles are local roads.

System of Interstate Highways—The importance of cities in the generation of highway traffic and the inadequacy of major routes connecting and traversing the cities has been doubly recognized in the Federal Highway Act of 1944. As has been indicated elsewhere in this report, funds are definitely earmarked for expenditure on the primary federal aid routes in urban areas. Further recognition is given in the provision for designating a national system of interstate highways.

The interstate system, which undoubtedly will become the top priority portion of the primary system, is aimed at connecting the principal urban centers of the country. The Act states that the system shall be "So located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities and industrial centers..."

The recommendations made for the Connecticut portion of the interstate system are shown herewith as submitted by the highway department after consultation with neighboring states. Before the close of the biennium, the Public Roads Administration tentatively approved the interstate routes, themselves, as distinguished from the "distributing routes" (see map symbols). The mileage in the accepted interstate routes totals 263, of which 60 miles was classified as urban.

There is something highly noteworthy and significant about the interstate designations in Connecticut as compared with other states. Except for Delaware, which has only a short section of the Philadelphia to Baltimore route as its entire system, Connecticut has the highest average traffic on the rural portions of the system. At the same time, the 263 miles of the System represents 1.84% of the total road and street mileage in the State. In relative size of system, Connecticut is surpassed only by Vermont, District of Columbia, Florida and four Rocky Mountain and desert states. Thus, even though the system is relatively one of the most extensive, it still has a concentration of traffic on it surpassed only by Delaware. Because it is on these routes of heavy travel that there exists now the greatest need for improvement, it is likely that in proportion to its size Connecticut faces a greater and more urgent need for major improvements than does any other state.

Long Range Program—As the biennium ends, the bureau is revising the long range program of state highway improvements and of estimating construction and maintenance needs of the local governmental units.

Development of the state highway program consists largely of bringing up to date the state-wide program developed two years ago and used by the Highway Advisory Commission in the establishment of its five-year program. Route and project studies which have since been completed permit more precise estimating in some cases. The

principal change, however, is in the cost estimates which must be raised to cover increased costs over those anticipated. Because it is intended to cover the program in considerable detail in a separate report upon completion of the work now in progress, no attempt will be made to cover the subject here. It is worth noting, though, that the long range state highway needs, which were estimated at about $250 millions in the last biennial report, will likely cost well over $300 millions in the light of going prices for construction work.

As a basis for the local road improvement estimate, a detailed inventory is being made of all unimproved roads. Each road is being logged with an automobile odometer. Road type and width are noted, as are the location of farms and dwellings. Estimates of traffic volumes are made as the roads are logged.

Project and Route Studies—During the biennium the study for an expressway plan for the Hartford area was completed and a report was published.

Route studies were completed for Route 59 in Bridgeport, Fairfield and Easton and for Route 9 from Hartford to and through Middletown.

The Route 59 study represents the first comprehensive evaluation of a secondary route. It was undertaken to establish the need for improvement of various portions of the route as a federal aid secondary project and to determine the pattern of improvements to the end that there will be a logical integration of improvements on the route in the years ahead. Detailed traffic counts were made and interviews were obtained from motor vehicle operators to determine the distribution of trip termini. Maintenance costs and accident records were analyzed. Based on the study, sections of the route most in need of improvement have been included in the federal aid secondary program being financed under the Federal Highway Act of 1944.

Route 9 from Hartford through Middletown to Old Saybrook is a Federal aid primary route and an important one for "Shore travel". The southern portion of the route through Chester, Deep River and Essex is very unsatisfactory particularly during the summer months when the old and crooked road is heavily traveled. Likewise, the route through Middletown represents a critical bottleneck under summer traffic conditions and has long been a source of great annoyance both to the travelers on Route 9 and the people of Middletown who have had their Main Street tied up with the "Shore travel".

The Route 9 study as it was made during the biennium was limited to the portion through Middletown and north to Hartford. The improvement of the Middletown section is included as a part of the urban program being financed under the Federal Highway Act of 1944.

A study has been made of the Danielson area to establish a program of improvements which will improve U. S. 6 and Route 12 travel into and through Danielson. This study was nearing completion at the close of the biennium. A study of Route 15 in East Hartford and Glastonbury was likewise nearly completed at that time.

A start has been made on the development of an expressway plan for New Haven. With the cooperation of the city there have been collected detailed traffic data including driver interviews on the main radiating arterials. Analysis is in progress. Topographic maps made from aerial photographs are being obtained to be used for the establishment of route locations.

During the summer of 1946 an extensive program of special field studies was initiated. These encompass complete area studies for Bridgeport, Danbury and Norwich and route studies on U. S. 1 at Stamford, Mystic, Old Lyme and between Guilford and Old Saybrook. Analysis and evaluation of the data obtained from these studies will provide the basis for future highway construction programs.

Accident Study—In cooperation with the National Safety Council, the State is making a study of accidents on 450 miles of our main highways covering the calendar year 1941. Fifteen other states are participating in the study which is aimed at establishing the degree of safety which can be expected from improved design characteristics such as are now being used on our main highways. The study will not only show the best designs, from the safety standpoint, but will indicate the over-all reduction in hazard that will result from the extensive main highway improvements now being planned.

BUREAU OF MATERIALS ENGINEERING

By Raymond T. Healy, *Materials Engineer*

The personnel of the bureau was cut 50 per cent during the war and it was difficult to carry on with such a small group. However, the laboratory gave the best service possible and quite often the small force had to be staggered. Some were required early in the morning to sample bituminous material so as not to hold up projects, and often it was necessary to have men work late into the night to test material taken from a distant tank car siding and rushed to the laboratory for an approved test. This made it possible to empty the cars in compliance with the war emergency restrictions on tank cars and tank car shipments.

The Maintenance and Town Aid bureaus needed many thousands of gallons of bitumen to maintain roads and bridges strained by heavy war traffic. Not one gallon of this material was spread before previous test and approval by the laboratory.

Highway equipment and signs had to be painted but paint containing the pigments and vehicles specified were unobtainable in large amounts. It was, therefore, necessary to purchase paint in smaller quantities. More testing was necessary to determine which substitute gave the best service in the field. The small group at the laboratory, will remember 1944-45 as the year spent in testing to find good substitutes for materials restricted by war agencies.

The laboratory also found time to do investigational work on air-entrained concrete.

In conjunction with post-war planning a great deal of boring work was done. Samples of soils from all proposed projects were sent to the laboratory, carefully analyzed and then furnished the design section.

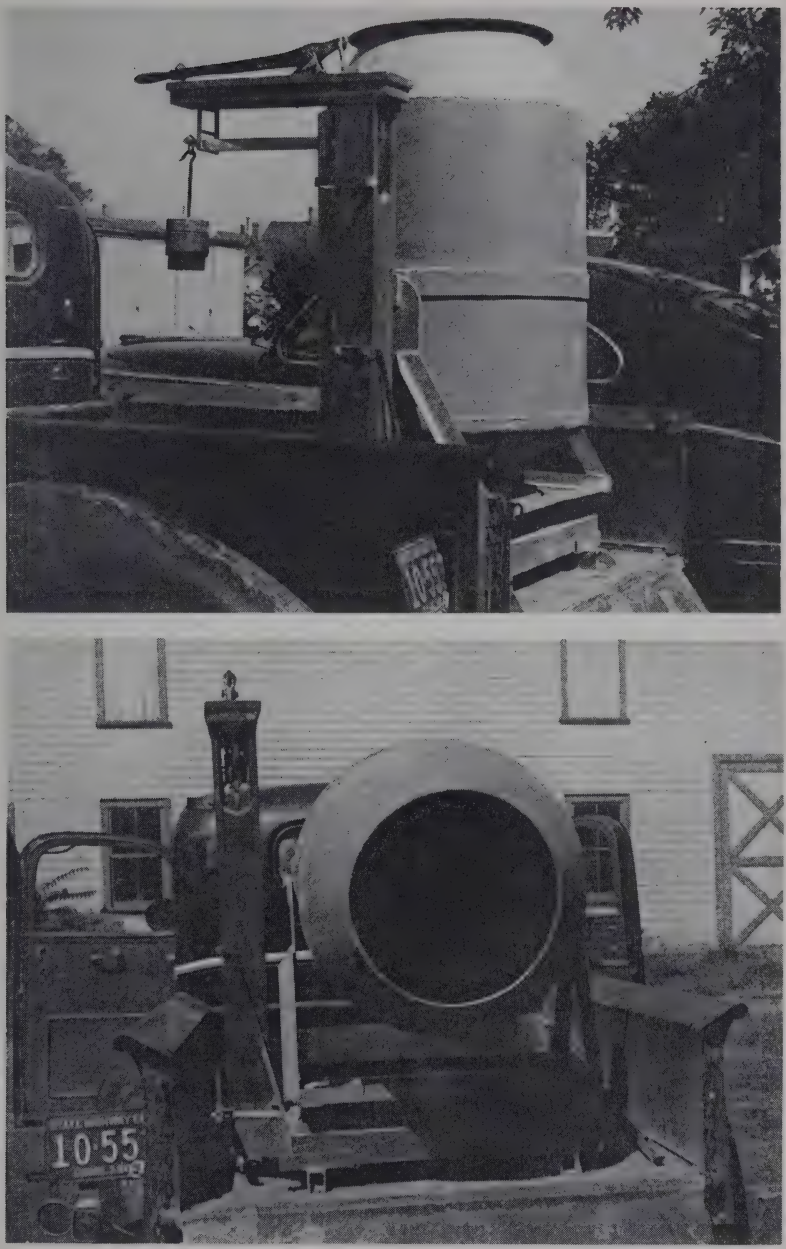
The war was over and everyone felt restrictions on critical materials would be released but only a small flow of good materials and products was released. When the department began to let contracts, the routine testing at the laboratory was increased and an urgent need for trained men arose. Although the men discharged from the service returned to their posts, more were needed and difficulty was encountered trying to get them, particularly in obtaining chemists.

The Bureau of Materials Engineering made the usual routine checks and analyses of bituminous materials, cements, steel, sand, stone, paints, etc. that are used in the construction and maintenance of Connecticut's bridges and highways. The state's inability to purchase reflector buttons, previously used to reflectorize signs and guide rail posts, necessitated turning to a new material known as Scotchlite. This material is a resin with glass beads impregnated in the surface and is attached to wood and metal. The Bureau of Materials Engineering was chosen to make investigations that will continue until satisfactory methods are found to apply this material to get the longest life in the field.

The laboratory carefully controls the technique of laying concrete pavement. Bulk cement, used in all our concrete pavement is a finely ground powder that is transported in tight cars from the cement mills to the projects. It is transferred from the cars to completely tight bins and then weighed out by an automatic mechanical scale. The laboratory has devised a means of checking this scale by having a batch of cement dropped into a cylinder mounted on a platform scale. If it is found that the weight in the cylinder does not check with the automatic scale, the automatic scale is checked by a technician from the laboratory, familiar with its mechanism and electrical wiring. If the trouble is minor he will correct it. If it cannot be repaired the batch plant is closed and the contractor is obliged to have the plant in proper working condition before being allowed to continue batching operations. The laboratory checks these scales at intervals to be certain they maintain an accurate weight.

From previous investigations it has been found that concrete having from three to six per cent air will be durable when exposed to freezing and thawing. The department is incorporating air in all new concrete pavement. The air entraining agents are added at the mixer and not at the mill.

For many years the department has used various mixes of concrete based on the weight of cement, stone and sand, such as 1-2-4 mix. Such a mix requires 94 pounds of cement, 188 pounds of sand and 376 pounds of stone. The laboratory has found that by obtaining the rodded weight per cubic foot of the stone used and the fineness modulus of the sand used and applying Professor Richardson's formula a much more workable and durable concrete is being obtained.



Cement testing apparatus mounted on pick-up truck.

From time to time aggregates going into concrete have been discussed but no real research work has been done on the aggregates in Connecticut; namely, Gravel and Trap Rock. During the fall of 1945 and winter of 1946 the department through the laboratory requested the Public Roads Administration, the National Sand and Gravel Association and the National Crushed Stone Association to participate in some cooperative tests. The above mentioned organizations accepted. Meetings were held at the laboratory in Portland and at the Public Roads Administration laboratory in Washington, D. C. All members agreed the work should be done at the laboratory in Washington but since the laboratory had much work scheduled and only a small personnel, it was necessary to delay the tests for two years. The highway department wanted the information sooner so the work was carried out in its laboratory at Portland.

This work was observed by some of the leading engineers on concrete in the country. All the information desired was not obtained so it will be necessary to run further tests during the winter of 1946 and 1947 to determine durability of these aggregates in concrete that has varying amounts of air entrained in it.

The investigation has been reviewed by the Public Roads Administration, which will participate in 50 per cent of the cost of the investigation. The results will give the State of Connecticut more permanent and durable pavement.

The laboratory strives to give its best service which often requires new equipment which is being manufactured very slowly. In the past men from the laboratory have gone to the various quarries and construction projects to lift samples of stone and gravel to return to the laboratory for test. When these samples are "off test" the supplier is notified to make changes, which when made require men to go back to resample the materials. To conserve time and mileage a testing machine has been mounted on a truck and a small generator attached to furnish electricity. This truck will travel to each quarry and test stone or gravel on the spot. Superintendents may view the tests and will be shown wherein the products are faulty if they do not meet specifications and, if required, check tests can be run without lapse of time. This method will be more economical for both laboratory and producers.

The Bureau of Materials Engineering is a "watch dog" charged with determining that the highway department receives the material as specified. During the past two years substitutes have been necessary and quick studies of them allowed the laboratory to determine which were best.

The value of the work done by the laboratory in routine testing and research is immeasurable.

AUDIT SECTION

By NILS A. ERICKSON, *Head Audit Clerk*

During the biennium normal audit operations were continued with respect to authorizations of payments to contractors and vendors for supplies and materials, as well as requisitions, payrolls, travelling expenses and subsistence, and inter-departmental and intra-departmental charges. With the termination of the war, the volume of detail work has shown an increase which, no doubt, will be corroborated in the reports of the other bureau of the department. The detail of increase in personnel is shown in the Executive Deputy Commissioner's bureau report, and from this information we note that for hourly paid employees for the fiscal year ending June 30, 1945, 27,046 payroll checks were written and for the fiscal year ending June 30, 1946, 33,117 payroll checks were written which will give some idea as to the return of normal operations in payroll work. During the biennium, the Federal Tax Law requiring payroll deductions for income tax purposes was changed on January 1, 1945 and again on January 1, 1946 which changes made considerably more detail work to effect the new rates for each employee on the respective payrolls. A change in rate was made by the hospitalization plan which also made the same detail change necessary on individuals as would the change of the tax law. The winter weather for the two seasons was such as to make the hourly paid employee payrolls considerably heavier operating the time and one-half law for overtime work. It has been the policy of the Audit Section to assist and serve all bureaus of the department in detailed operations affecting audit procedures.

TABLE 1—RECEIPTS OF THE HIGHWAY DEPARTMENT FOR THE BIENNIUM JULY 1, 1944 TO JUNE 30, 1946

	Fiscal Year 1944-45	*Fiscal Year 1945-46*	*Biennium*
Receipts From Motor Vehicle Department			
Gasoline Tax	$ 7,051,682.01	$ 9,100,849.18	$16,152,531.19
Gasoline Station Licenses	39,569.00	49,234.10	88,803.10
Motor Vehicle Registrations	5,043,273.98	5,610,765.41	10,654,039.39
Motor Vehicle Operator's Licenses	1,738,465.14	2,033,608.04	3,772,073.18
Motor Vehicle Fines and Costs	1,695.00	1,753.95	3,448.95
Semi-Annual Inspection Fees	23,958.50	35,906.50	59,865.00
Transfer of Registrations	55,859.93	94,452.30	150,312.23
Miscellaneous Fees	11,341.60	13,591.38	24,932.98
Proceeds of Sales	34,273.50	48,367.60	82,641.10
Refunds and Surplus Receipts	19,657.50	27,472.89	47,130.39
Gross Receipts	$14,019,776.16	$17,016,001.35	$31,035,777.51
Less—Authorized Operating Costs—(See Table 2)	1,558,255.04	1,660,485.71	3,218,740.75
Net Receipts From Motor Vehicle Department	$12,461,521.12	$15,355,515.64	$27,817,036.76
Federal Aid Grants and Donations	326,586.01	346,325.74	672,911.75
Receipts From Towns on State Aid:			
Town's share of Regular State Aid	17,060.76	47,642.80	64,703.56
Receipts From Merritt Parkway Tolls	334,083.49	703,117.29	1,037,200.78
Interest From Bonds	.....	385,153.69	385,153.69
Miscellaneous:			
Motor Bus Tax	370,041.17	337,461.75	707,502.92
Rents	2,299.21	2,050.45	4,349.66
Sale of Junk	3,421.47	4,225.62	7,647.09
Ferry and Dockage Fees	12,247.60	16,836.60	29,084.20
Sale of Fixed Assets	29,011.14	35,820.72	64,831.86
Highway Surplus Receipts	31,827.40	36,303.31	68,130.71
Rents and Royalties on Gas Stations	40,912.10	100,706.07	141,618.17
Reimbursements for Current Expenditures	211,747.83	167,996.99	379,744.82
Total Miscellaneous	$ 701,507.92	$ 701,401.51	$ 1,402,909.43
Grand Total	$13,840,759.30	$17,539,156.67	$31,379,915.97

TABLE 2 — DETAILED BREAKDOWN OF AUTHORIZED OPERATING COSTS DEDUCTED FROM GROSS RECEIPTS OF MOTOR VEHICLE DEPARTMENT

	Fiscal Year 1944-45	*Fiscal Year 1945-46*	*Biennium*
Refunds:			
Gas Tax Refunds	$ 156,406.50	$ 137,536.77	$ 293,943.27
Refund of Motor Vehicle Fees	17,830.36	22,407.28	40,237.64
	$ 174,236.86	$ 159,944.05	$ 334,180.91
Operating Costs:			
Motor Vehicle Department Expenses	$ 861,598.42	$ 977,464.10	$1,839,062.52
State Police Dept. Expenses	500,000.00	500,000.00	1,000,000.00
Highway Safety Commission	20,635.76	22,669.64	43,305.40
	$1,382,234.18	$1,500,133.74	$2,882,367.92
Insurance:			
Motor Vehicle Department	1,784.00	407.92	2,191.92
Total Deductions	$1,558,255.04	$1,660,485.71	$3,218,740.75

TABLE 3—EXPENDITURES OF THE HIGHWAY DEPARTMENT FOR THE BIENNIUM JULY 1, 1944 TO JUNE 30, 1946

(See Table 3B for Definitions of these Expenditures)

	Fiscal Year 1944-1945	Fiscal Year 1945-1946	Biennium	Per Cent
Construction and Reconstruction:				
Construction Administration	$ 123,477.72	$ 150,871.49	$ 274,349.21	
Right of Way Administration	53,472.04	59,254.07	112,726.11	
State Highway Construction & Reconstr.	1,576,038.43	2,084,036.37	3,660,074.80	
Establishment of Boundary Lines	21,087.07	45,163.02	66,250.09	
State Aid Administration	29,369.82	30,887.28	60,257.10	
State Aid Construction	375,396.20	883,597.51	1,258,993.71	
Merritt Parkway Construction	3,647.23	813.31	4,460.54	
Middletown-Portland Bridge	.....	355.26	355.26	
Wilbur Cross Parkway	148,592.35	1,476,042.45	1,624,634.80	
Hartford-East Hartford Bridge	1,216.84	354,434.66	355,651.50	
Groton-New London Bridge	77,401.58*	57,770.56	19,631.02*	
Old Saybrook-Old Lyme Bridge	.....	41,691.85	41,691.85	
	$ 2,254,896.12	$ 5,184,917.83	$ 7,439,813.95	26.51
*Sale of Salvaged Materials and Rent of State owned buildings credited against 1944-1945 Expenditures			$89,849.02	
Less: 1944-1945 Expenditures			12,447.44	
Excess of Credits over Expenditures, 1944-1945			$77,401.58	
Maintenance:				
Maintenance Administration	$ 199,349.31	$ 205,997.69	$ 405,347.00	
General Maintenance and Repairs	2,009,086.28	2,443,670.20	4,452,756.48	
Protection from & Removal of Snow & Ice	1,155,763.80	1,230,522.06	2,386,285.86	
Roadside Development Administration	48,602.08	56,818.93	105,421.01	
Roadside Maintenance	387,386.56	518,255.05	905,641.61	
Toll Stations Operation & Maintenance	97,554.53	115,969.12	213,523.65	
Bridge Maintenance and Inspection	150,184.15	139,772.83	289,956.98	
Operation and Maintenance of Ferries	27,506.18	26,991.99	54,498.17	
Operation of Draw Bridges	87,953.80	88,619.85	176,573.65	
Repair of Property Damaged by Accident	14,732.25	18,030.77	32,763.02	

	Fiscal Year 1944-1945	Fiscal Year 1945-1946	Biennium	Per Cent
Maintenance of Street Railway Tracks on Drawbridges	1,500.00	1,500.00	3,000.00	
Highway Control and Traffic Service	195,229.06	213,706.42	408,935.48	
Dockmaster at Guilford Harbor Dock	122.00	107.00	229.00	
	$ 4,374,970.00	$ 5,059,961.91	$ 9,434,931.91	33.62
Payments for Past State Highway Construction:				
Retirement & Interest on Merritt Parkway Bonds	$ 1,123,690.00	$ 1,106,190.00	$ 2,229,880.00	
Retirement & Interest on Middletown-Portland Bridge Bonds	359,675.00	353,875.00	713,550.00	
Military Leave	1,000.00	900.00	1,900.00	
Anticipated State Aid Advances	204,728.68	157,567.91	362,296.59	
	$ 1,689,093.68	$ 1,618,532.91	$ 3,307,626.59	11.79
Town Aid Construction & Maintenance:				
Engineering Advertising, etc.	$ 127,269.01	$ 183,908.24	$ 311,177.25	
Town Aid Road Work	2,367,865.68	3,467,237.43	5,835,103.11	
	$ 2,495,134.69	$ 3,651,145.67	$ 6,146,280.36	21.90
General Administration:				
Commissioner's Unit	$ 99,258.93	$ 106,561.91	$ 205,820.84	
Business Administration	286,246.65	321,790.54	608,037.19	
	$ 385,505.58	$ 428,352.45	$ 813,858.03	2.90
Fixed Charges:				
Highway Share of Retirement Pay	$ 61,070.77	$ 77,930.22	$ 139,000.99	
Legistlative Grants	957.00	1,653.27	2,610.27	
Highway Insurance	149,876.79	137,325.42	287,202.21	
	$ 211,904.56	$ 216,908.91	$ 428,813.47	1.53
Plant & Equipment				
Land, Buildings and New Equipment	$ 164,062.32	$ 292,007.16	$ 456,069.48	
Less—Applied Depreciation, Insurance & Equipment Earnings—Table 3A	—352,606.01	—361,295.17	—713,901.18	
New Equipment Earnings	$ —188,543.69	$ —69,288.01	$ —257,831.70	—0.92

	Fiscal Year 1944-1945	Fiscal Year 1945-1946	Biennium	Per Cent
Other Expenses:				
Refunds of Excess Receipts	$ 14.40	$ 372.57	$ 386.97	
Office Equipment Purchased by Comptroller	2,289.50	1,640.88	3,930.38	
Highway Planning Survey	59,236.66	73,874.51	133,111 17	
Materials Engineering	56,537.29	78,798.64	135,335.93	
Reconnaissance Survey	39,421.27	5,449.33	44,870.60	
Guilford Dock and Harbor	39.26	5.60	44.86	
Geodectic Survey	2,795.60	3,330.27	6,125.87	
	$ 160,333.98	$ 163,471.80	$ 323,805.78	1.16
Consumable Supplies and Materials in Stores:				
Increase in Inventory—Table 3A	$ —86,031.38	$ 35,338.73	$ —50,692.65	
Expenses Recovered or Recoverable	239,534.51	233,898.65	473,433.16	
	$ 153,503.13	$ 269,237.38	$ 422,740.51	1.51
Grand Total	$11,536,798.05	$16,523,240.85	$28,060,038.90	100.00

TABLE 3A—OTHER CURRENT RESOURCES

Accrued Resources on Plant & Equipment				
Insurance Applied	$ 54,635.01	$ 60,077.68	$ 114,712.69	
Depreciation Applied	280,243.23	227,556.83	507,800.06	
Net Earnings on Equipment	17,727.77	73,660.66	91,388.43	
	$ 352,606.01	$ 361,295.17	$ 713,901.18	
Inventory:				
Salvage Materials Taken into Stores	$ 2,598.97	$ 2,864.30	$ 5,463.27	
Increase or Decrease in Stored Supplies and Materials	83,432.41	—38,203.03	45,229.38	
	$ 86,031.38	$ —35,338.73	$ 50,692.65	
Total Other Resources	$ 438,637.39	$ 325,956.44	$ 764,593.83	

TABLE NO. 3(b)—DEFINITIONS OF FUNCTIONS SHOWN ON TABLE NO. 3

Construction and Reconstruction

Construction Administration
The cost of planning, directing and operating the construction program, other than direct labor and materials expended on engineering and construction work, also supervision of bridge and ferry maintenance.

Right of Way Administration
The cost of planning, directing and operating the work of the Bureau of Rights of Way, other than direct labor and materials expended on engineering work and the costs of rights of way.

State Highway Construction and Reconstruction
Construction and reconstruction of roads, bridges, overpasses or underpasses, correction of sight lines, sharp turns or bad grades on the State Highway System and reconstruction work performed by maintenance units.

Establishment of Boundary Lines
Expenses of establishing boundary lines, such as making surveys, searching titles, preparation of maps, setting boundary stones, etc.

State Aid Administration
Administration expenses of the Office of the State and Town Aid Agent including clerks.

State Aid Construction
Construction costs on roads in the State Aid System constructed under the provisions of the State Aid law.

Merritt Parkway Construction
Expenditures for construction on the Merritt Parkway.

Middletown-Portland Bridge
Expenditures for condemnation settlement.

Wilbur Cross Parkway Construction
Expenditures on the Wilbur Cross Parkway for engineering and construction.

Hartford-East Hartford Bridge
Expenditures on this bridge and approaches from bond issue and highway funds.

Groton-New London Bridge
Expenditures on this bridge and approaches from bond issue and highway funds.

Old Lyme-Old Saybrook Bridge
Expenditures for location and design on Old Lyme-Old Saybrook Bridge.

Maintenance

Maintenance Administration
Expenses of supervision of general maintenance of State Highways, Hartford and six district offices throughout the State are included.

General Maintenance and Repairs
Repairs and upkeep to road surface, shoulders, drainage, guide-rail and safety devices, etc.

Protection from and Removal of Snow and Ice
Expenses of snow and ice removal, sanding, work on snow fences and other related work.

Roadside Administration
Expenses of supervision in Hartford office and in field offices at Litchfield, Norwalk, New Canaan and Lisbon, of the Bureau of Roadside Development.

Roadside Maintenance
Maintenance of roadsides, including mowing, care of trees, highway gardens, picnic areas, and other related work. (See table No. 9.) A small amount of roadside development work which, by its nature, cannot well be separated from maintenance, is included here.

Toll House Operation and Maintenance
All expenditures incidental to toll collections.

Bridge Maintenance and Inspection
Expenditures for general repairs and inspection of State Highway bridges.

Operation and Maintenance of Ferries

Expenditures including salaries and wages of crews, and repairs incidental to operating the two State ferries.

Operation of Draw Bridges

Expenditures including draw-bridge operators' salaries and costs of minor repairs.

Repairs of Property Damaged by Accident

Costs of repairs of highway facilities on equipment, not recovered or recoverable.

Maintenance of Street Railway Tracks on Draw Bridges

Expenditures per Section 1416, Chapter 79, of the Public Acts.

Highway Control and Traffic Service

Expenses of the State Traffic Commission, also of the Division of Highway Control for supervision of permits, marking of pavements, placing and maintaining signs, accident prevention and investigation and traffic studies.

Dockmaster at Guilford Harbor Dock

Expenses in connection with collection of dockage fees at Guilford Dock.

Payments for Past State Highway Construction

Retirement and Interest on Merritt Parkway Bonds

$15,000,000.00 bonds issued by Fairfield County to finance construction of the Merritt Parkway. Interest on these bonds semi-annually, and retirement of same in 15 annual installments to be paid to the County from State Highway Funds (See Table No. 6).

Retirement and Interest on Middletown-Portland Bridge Bonds

$3,500,000.00 bonds issued by Middlesex County to finance construction of the Middletown-Portland Bridge. Interest on these bonds semi-annually and retirement of same in 10 annual installments to be paid to the County from State Highway Funds (See Table No. 6).

Military Leave

Expenses for payment of $100.00 each to men entering the Armed Forces.

Payment to Anticipated State Aid Advances

Payment to the Towns of the State's share of funds advanced under the provision of Section 1497.

Town Aid Construction and Maintenance

Engineering, Advertising, etc.

Expenditures of Town Aid and Unimproved Town Aid Supervision, designs, plans, surveys, inspection and advertising. These costs do not come out of the $4.000,000.00 Dirt Road Appropriation or the $1,000,000.00 under 190-F.

Town Aid Road Work also 190F

Construction of town roads and bridges, surface treatment and the furnishing of materials pertinent to town road construction and maintenance.

General Administration

Commissioner's Unit

Expenses of Commissioner, deputy, executive deputy, personnel and Audit Sections.

Business Administration

Expenses of administrative and clerical employees of this bureau, except those included in General Supervision.

Fixed Charges

Highway Share of Retirement Pay

The highway fund is required to finance the 50 per cent State contribution to pay pensions to retired highway employees.

Legislative Grants

Grants made by the Legislature from highway funds by Special Act.

Insurance

Payments made by the Comptroller from highway funds under Section 1468 (See Table No. 10.)

Plant and Equipment

New Equipment, Land and Buildings
Cost of new Highway equipment, major repairs and improvements and expenses of land and non-structural improvements of land and buildings.

Other Expenses

Statewide Highway Planning Survey
Cost of rural road inventory, studies of road use and road life, traffic surveys, etc.

Geodetic Survey
Cost of establishing State-wide Plane Co-ordinate System in co-operation with the Federal Government.

Guilford Dock and Harbor Improvement
Expenditures from Legislative Appropriation for dredging, etc.

Reconnaissance Survey
Expenses for preliminary work on proposed parallel highway in Fairfield County from New York State Line to Bridgeport, Conn.

Materials Engineering
Expenses of chemical and physical tests of construction and maintenance materials.

Expenditures Recovered or Recoverable
Work done for and materials furnished to various municipalities, public utilities and individuals, the cost of which is to be repaid the department by the parties involved.

TABLE 3C—DEFINITIONS OF FUNCTIONS SHOWN ON TABLE NO. 3A

Other Current Resources

Insurance Applied
Distribution of expenses against operating accounts for insurance credited as a resource as the insurance is paid from a different account.

Depreciation Applied
This figure represents the value of fixed assets consumed during the fiscal year and is offset by charges against the individual pieces of equipment as part of the cost of operation.

Net Earnings on Equipment
All expenses for the maintenance and operation of our plant and equipment including insurance and depreciation are charged direct to the pieces of equipment involved. When this equipment is used on a highway project, this project is charged rent at an hourly or mileage rate and the equipment credited with earned rent. This method enables us to determine accurately the cost of each project.

Salvaged Material Taken Into Stores
This resource represents the estimated value of salvaged material charged into our Stores Account.

Increase or Decrease in Inventory
The increase is caused by excess of purchases over withdrawals or decrease by excess withdrawals over purchases.

TABLE 4—FINANCIAL CONDITION OF THE HIGHWAY DEPARTMENT AT THE CLOSE OF THE BIENNIUM ENDING JUNE 30, 1946

ASSETS

Current Assets		
*Cash and Specific Appropriation		
Available Cash Balance, Highway Fund		$ 8,004,549.12
Cash in Closed Banks Charged to the Highway Fund		70,579.93
Transferred from Highway Fund, money expended under Specific Appropriation for Merritt Highway, returned to General Fund per Board of Finance & Control		1,000,000.00
Middletown-Portland Bridge Fund		125,983.62
Wilbur Cross Parkway Fund		898,479.40
Hartford-East Hartford Bridge Fund		266,371.80
Groton-New London Bridge Fund		181,902.75
Old Saybrook-Old Lyme Bridge Fund		2,724.34
Guilford Dock and Harbor Improvement Appropriation		4,949.19
Investments		
Investment in United States Securities—Highway Fund	$ 7,008,487.04	
Investment in United States Securities—Wilbur Cross Parkway Fund	3,003,637.30	10,012,124.34
Inventory		
Consumable Supplies and Materials on hand including Stock in Nurseries		774,995.68
Taxes Assessed but not Collected		
Taxes on Gasoline		896,257.71
Accounts Receivable		
Federal Government	$ 232,637.93	
Towns	13,583.07	
Other Political Subdivisions	93.19	
Other State Departments	11,762.01	
New York, New Haven & Hartford Railroad	14.25	
Department Employees	245.31	
Miscellaneous	5,657.02	
	$ 263,992.78	
Reserve for Bad & Doubtful Accounts	1,000.00	262,992.78
Current Assets		$22,501,910.66
Fixed Assets		
Appraised Value of Equipment owned June 30, 1946	$ 1,091,704.73	
Appraised Value of Land and Buildings owned June 30, 1946	903,331.34	1,995,036.07
Total Assets		$24,496,946.73

LIABILITIES

Accounts Payable		
Highway Accounts Payable	$1,126,824.99	
Accounts Payable for Operation and Maintenance of Equipment	38,899.72	
Accounts Payable for Consumable Supplies & Materials	58,397.87	
Wilbur Cross Parkway Accounts Payable	231,181.39	
Hartford-East Hartford Bridge Accounts Payable	34,253.85	
Groton-New London Bridge Accounts Payable	5,175.70	
Old Saybrook-Old Lyme Bridge Accounts Payable	147.64	
		$1,494,881.16

Commitments			
Highway Fund		$7,804,808.54	
Wilbur Cross Parkway Fund		1,752,082.46	
Hartford-East Hartford Bridge Fund		80,190.47	
Groton-New London Bridge Fund		62,449.48	
Old Saybrook-Old Lyme Bridge Fund		2,576.70	
Guilford Dock and Harbor Improvement Appropriation		183.71	
			9,702,291.36

RESERVES

Reserve to Cover Loan to General Fund			$1,000,000.00	
Reserve for Cash in Closed Banks			70,579.93	
Reserve for Construction of Middletown-Portland Bridge			125,983.62	
Reserve for Construction of Wilbur Cross Parkway			1,918,852.85	
Reserve for Construction of Hartford-East Hartford Bridge			151,927.48	
Reserve for Construction of Groton-New London Bridge			114,277.57	
Reserve for Guilford Dock & Harbor Improvement			4,765.48	
Reserve for Construction of Old Saybrook-Old Lyme Bridge			.....	
Reserve for State Aid Construction				
Available for Agreement		$1,136,954.32		
Under Agreement		1,235,623.68	2,372,578.00	
Reserve for Town Aid				
Sec. 190F		$2,669,209.04		
****Sec. 512C				
Allocated to towns but not to projects	$1,974,598.09			
Alloted to projects but not allocated to towns until after June 30, 1946	−1,400,882.09	573,716.00	3,242,925.04	
***Working Capital Requirements			2,995,036.07	11,996,926.04

EXCESS OF ASSETS OVER ALL LIABILITIES & RESERVES

Available Means of Financing Operations Carried Forward to the next Biennium—Highway Fund		$1,302,848.17
Total Liabilities, Reserves, & Means of Financing		$24,496,946.73

RECONCILIATION OF MEANS OF FINANCING JUNE 30, 1944 WITH AVAILABLE MEANS OF FINANCING AS OF JUNE 30, 1946

Available Means of Financing June 30, 1944 as reported in Table 4 for the Biennium Ended June 30, 1944			$ 316,804.83
Add			
Canceled checks of Prior Years	$	992.22	
Receipts of the Highway Department—All Funds		34,598,656.72	
Other Current Resources		764,593.83	
Increase in Taxes Assessed but not Collected		595,630.10	
Decrease in Reserves and Working Capital Requirements		3,069,335.09	

Increase in Fixed Assets	66,621.21	
Adjustments of Prior Years which affect the Cash Balance	1,170.00	39,096,999.17
		$39,413,804.00
Deduct		
‡Expenditures of the Highway Department—All Funds	$28,824,632.73	
Highway Share of State Police Dept. Expenses	1,000,000.00	
Motor Vehicle Dept. Expenses	1,839,062.52	
Motor Vehicle Dept. Insurance	2,191.92	
Highway Safety Commission Expenses	43,305.40	
Refunds of Income	334,180.91	
Decrease in Inventory	61,975.25	
Decrease in Accounts Receivable	89,600.28	
Increase in Commitments	5,759,467.23	
Returned to General Fund—Guilford Dock & Harbor lapsed	352.26	
Loss on Cash in Closed Banks (City Bank)	3,187.33	
Transfer for Education and Scientific Displays on Merritt Parkway	150,000.00	
Transfer for Merritt Parkway Commission Operating Expenses	3,000.00	38,110,995.83
Available Means of Financing, June 30, 1946		$1,302,848.17

* It will be noted that the available cash of the various funds in Table 4 does not agree with the available cash at the end of the biennium in Table 5. This is due to the fact that the accounts payable are shown in Table 4 as separate items. If these items are deducted from available cash in Table 4, they will agree.

† This item includes $1,000,000.00 required to finance recoverable expenditures, consumable supplies and materials in our stores, and in addition the current value of fixed assets.

‡ In order to check this figure with total expenditures on Table 3, it is necessary to deduct "Other current resources" ($764,593.83).

**** As provided in Section 322G of the Cumulative Supplement to the General Statutes there is to be allocated to towns $2,000,000.00 additional on or before July 1, 1953.

TABLE 5—STATEMENT OF CASH BALANCE, RECEIPTS AND EXPENDITURES OF THE SPECIAL FUNDS AND APPROPRIATIONS FOR THE BIENNIUM JULY 1, 1944 TO JUNE 30, 1946

MIDDLETOWN-PORTLAND BRIDGE FUND

Available Cash Balance at the end of the Previous Biennium	$126,338.88
Expenditures for 1945-46	355.26
Available Cash Balance as of the end of the Biennium	$125,983.62

WILBUR CROSS PARKWAY FUND

Available Cash Balance at the end of the Previous Biennium		$3,519,596.52	
Add—Transfers of expenditures of Previous Biennium		299.83	$3,519,896.35
Receipts of the Biennium			
Receipts from Tolls for the fiscal year 1944-45		$334,083.49	
Receipts from Tolls for the fiscal year 1945-46		703,117.29	
5% of Gross Receipts of the Motor Vehicle Dept. for the fiscal year 1944-45		700,005.90	
5% of Gross Receipts of the Motor Vehicle Dept. for the period July through Sept. 1945-46		136,444.63	
Realized from Investment in U. S. Securities 1945-46		115,546.10	1,989,197.41
			$5,509,093.76
Receipts of the Biennium			
Ordinary Recurring Expenses			
Operation of the Toll Houses for fiscal year 1944-45		$97,554.53	
Operation of the Toll Houses for fiscal year 1945-46		115,586.57	
		$213,141.10	
Capital Outlay			
Construction of the Wilbur Cross Parkway 1944-45	$148,592.35		
Construction of the Wlibur Cross Parkway 1945-46	$1,476,042.45		
Major Improvements on Toll Houses 1945-46	382.55		
	$1,476,425.00	1,625,017.35	1,838,158.45
			$3,670,935.31
Invested in U. S. Securities			3,003,637.30
Available Cash Balance as of the end of the Biennium			$667,298.01

HARTFORD-EAST HARTFORD BRIDGE FUND

Available Cash Balance at the end of Previous Biennium	$502,243.32	
Add—Transfers of expenditures of Previous Biennium	9.82	$502,253.14
Expenditures of the Biennium		
Expenditures of the fiscal year 1944-45	$3,980.60	
Expenditures of the fiscal year 1945-46	266,154.59	270,135.19
Available Cash Balance as of the end of the Biennium		$232,117.95

GROTON-NEW LONDON BRIDGE FUND

Available Cash Balance at the end of Previous Biennium	$156,733.07	
Add—Transfers of expenditures of Previous Biennium	282.66	$157,015.73
Expenditures of the Biennium		
Expenditures of the fiscal year 1944-45	-$77,481.88	
Expenditures of the fiscal year 1945-46	57,770.56	-19,711.32
Available Cash Balance as of the end of the Biennium		$176,727.05

OLD SAYBROOK-OLD LYME BRIDGE FUND

Amount transferred from the Regular State Aid Fund Available to the Town of Old Lyme		$20,000.00
Expenditures of the Biennium		
Expenditures of the fiscal year 1945-46		17,423.30
Available Cash Balance as of the end of the Biennium		$2,576.70

GUILFORD DOCK & HARBOR IMPROVEMENT APPROPRIATION

Available Cash Balance at the end of Previous Biennium		*$4,994.05
Expenditures of the Biennium		
Expenditures of the fiscal year 1944-45	$39.26	
Expenditures of the fiscal year 1945-46	5.60	44.86
Available Cash Balance as of the end of the Biennium		$4,949.19

* Difference in above amount and balance as shown on the report for the Previous Biennium due to the lapsing of the 1939 Appropriation on June 30, 1944 Balance $352.26.

TABLE 6—PARKWAY AND BRIDGE BONDS

This statement shows (a) amounts of bonds issued by Counties, in connection with the construction of the Merritt Parkway and the Middletown-Portland Bridge, the total of repayments to June 30, 1946 and the outstanding balance as of July 1, 1946; (b) interest paid on County Bonds to and including June 30, 1946.

MERRITT PARKWAY

(a)		
Amount of Bonds Sold 1st Issue	$6,480,000.00	
Less Payments to County to Reduce Principal	4,320,000.00	
Amount to be Liquidated		$2,160,000.00
Amount of Bonds Sold 2nd Issue	$8,520,000.00	
Less Payments to County to Reduce Principal	5,112,000.00	
Amount to be Liquidated		3,408,000.00
Total Amount to be Liquidated		$5,568,000.00
(b)		
Interest Payments		
First Issue	$812,700.00	
Second Issue	1,013,880.00	
Total Interest Payments		$1,826,580.00

MIDDLETOWN-PORTLAND BRIDGE

(a)		
Amount of Bonds Sold 1st Issue	$2,200,000.00	
Less Payments to County to Reduce Principal	2,200,000.00	
Amount to be Liquidated		$00.00
Amount of Bonds Sold 2nd Issue	$1,300,000.00	
Less Payments to County to Reduce Principal	1,300,000.00	
Amount to be Liquidated		00.00
Total Amount to be Liquidated		00.00
(b)		
Interest Payments		
First Issue	$211,750.00	
Second Issue	107,250.00	
Total Interest Payments		$319,000.00

TABLE 7—ANALYSIS OF CONSTRUCTION AND RECONSTRUCTION AND TOWN AID EXPENDITURES BY ACTIVITIES FOR BIENNIUM 1944 TO 1946

	State Highway Construction Reconstruction	State Aid Construction	Sec. 512 and 190F Town Aid	Merritt Parkway	Wilbur Cross Parkway	Hartford-East Hartford Bridge	Groton-New London Bridge	Old Lyme-Old Saybrook Bridge	Middletown Portland Bridge
Bridge Commission Expenses	.....	.....	.....	.....	.....	.....	.....	$3,423.30	.....
Professional Services	.....	.....	.....	.....	.....	.....	.....	7,000.00	.....
Preliminary Engineering & Advertising	$151,769.78	$40,526.06	$40,422.26	..	$2,777.94	$868.36	$25.52	20,986.51	$300.00
Designs and Estimates	187,913.52	56,156.10	45,965.08	$16.88	26,220.40	4,435.57	669.41	7,475.26	55.26
Cost of Land	597,793.54	3,195.00	300.00	352.27	137,683.33	965.00	9,772.99	200.00	.....
Buying or Abandoning Rights of Way	128,017.67	1,794.75	.32	833.88	7,641.42	996.77	289.97	1,432.97	.....
Construction Contracts	1,431,970.18	745,357.78	524,933.52	.....	1,365,764.33	325,549.27	38,839.02	.....	.....
Construction Surveys	44,228.84	27,366.26	25,762.22	.....	34,522.59	7,650.66	266.75	.....	.....
Construction Inspection	46,174.45	44,840.91	52,489.73	269.66	33,360.22	5,497.74	2,646.06	.....	.....
State-Furnished Materials	1,838.72	1,072.27	1,676.97	.....	606.68	151.20	.....	.....	.....
Traffic Control and Detour Maintenance	3,644.42	1,598.86	185.63	.....	3,917.93	786.83	.....	.....	.....
Work by Public Utilities	21,569.00	.....	.....	.....	3,087.78	4,448.40	475.52	.....	.....
Work Additional to Original Contract	50,642.75	2,899.35	440.00	2,987.85	137.07	10,454.44	1,377.67	.....	.....
Force Account Construction	516.85	332,788.74	546,286.23	.....	.....	.....	.....	.....	.....
Slope Stabilization	58,023.93	133.45	.....	.....	2,293.11	177.96	.....	.....	.....
Roadside Improvements	15,746.91	484.18	.....	.....	6,622.00	1,229.52	3,378.23	.....	.....
Penalties	.....	780.00	.....	.....	.....	.....	.....	.....	.....
Transporting Tools and Equipment	.....	.....	58.13	.....	.....	.....	.....	.....	.....
Upkeep of Replacement of Small Tools and Barrier Signs	.....	.....	203.81	.....	.....	.....	.....	.....	.....
Unproductive Personal Services	116.19	.....	5,448.64	.....	.....	1,336.58	305.88	1,163.81	.....
Charges for Non-Rental Equipment	.....	.....	4,234.16	.....	.....	.....	.....	.....	.....
Retroactive Wages	.....	.....	1,928.88	.....	.....	.....	.....	10.00	.....
Grants for Materials	.....	.....	1,224,094.76	.....	.....	.....	.....	.....	.....
Grants for Town Road Maintenance	.....	.....	3,503,706.21	.....	.....	.....	.....	.....	.....
Town's Share of Payments from State Aid Funds	.....	.....	33,479.79	.....	.....	.....	.....	.....	.....
Items Impractical for Distribution	211,647.50	.....	.....	.....	.....	.....	.....	.....	.....
Travelled Way & Shoulder Betterments	143,349.91	.....	.....	.....	.....	.....	.....	.....	.....
Guide Railing	28,939.21	.....	.....	.....	.....	.....	.....	.....	.....
Surface and Subsurface Drainage	334,064.86	.....	.....	.....	.....	.....	.....	.....	.....
Stone Surfacing	150,038.41	.....	.....	.....	.....	.....	.....	.....	.....
Construction of Rotaries	1,969.89	.....	.....	.....	.....	.....	.....	.....	.....
Landscaping on Existing State Highway Roadsides	40,656.93	.....	.....	.....	.....	.....	.....	.....	.....
Construction of Picnic Areas	7,979.55	.....	.....	.....	.....	.....	.....	.....	.....
Construction of Truck Scales	49.59	.....	.....	.....	.....	.....	.....	.....	.....
Town Aid Engineering	.....	.....	134,664.02	.....	.....	.....	.....	.....	.....
Rail Removal	1,412.20	.....	.....	.....	.....	.....	.....	.....	.....
	$3,660,074.80	$1,258,993.71	$6,146,280.36	$4,460.54	$1,624,634.80	$355,651.50	−$19,631.02	$41,691.85	$355.26

TABLE 8—MILEAGE AND TYPES OF ACCEPTED PROJECTS

PROJECTS COMPLETED AND ACCEPTED ON THE STATE HIGHWAY SYSTEM DURING THE FISCAL YEARS OF 1944-45 AND 1945-46

	1944-45		1945-46		Biennium	
	Miles	Total	Miles	Total	Miles	Total
New Construction						
Graded	...	...	...	...	...	...
Gravel	...	...	...	...	...	...
Waterbound Macadam	...	...	.33	...	.33	...
Bituminous Macadam	...	...	.12	...	.12	...
Bituminous Concrete	.01	...	.15	...	.16	...
Reinforced Concrete	...	...	2.43	...	2.43	...
		.01		3.03		3.04
Reconstruction						
Graded	...	...	...	...	...	...
Gravel	...	...	.35	...	.35	...
Waterbound Macadam	.07	...	...	...	.07	...
Bituminous Macadam	...	...	.01	...	.01	...
Bituminous Concrete	1.51	...	.45	...	1.96	...
Reinforced Concrete	...	...	3.86	...	3.86	...
		1.58		4.67		6.25
		1.59		7.70		9.29

TOWN AID PROJECTS COMPLETED AND ACCEPTED DURING THE FISCAL YEARS OF 1944-45 AND 1945-46

Graded	2.21	...	2.06	...	4.27	...
Loose Gravel	17.24	...	20.07	...	37.31	...
Rolled Gravel	7.32	...	13.24	...	20.56	...
Loose Gravel (Oiled)	...	...	3.11	...	3.11	...
Rolled Gravel (Oiled)	.37	...	6.04	...	6.41	...
Waterbound Macadam	...	...	...	...	...	...
Bituminous Macadam	...	...	1.02	...	1.02	...
Bituminous Concrete	1.25	...	...	...	1.25	...
Reinforced Concrete	.07	...	...	...	.07	...
		28.46		45.54		74.00

TABLE 9—INSURANCE

The State Highway Commissioner has no responsibility in the matter of insurance. All insurance is placed by the State Comptroller, who retains custody of the policies but premiums are paid from the highway fund on the warrants of the Comptroller. Insurance paid during the fiscal year 1944-1945 was $149,876.79 and for 1945-1946 was $137,325.42 or a total of $287,202.21 for the biennium. The costs are distributed to the various operating accounts.

TABLE 10—STATE OWNED AUTOMOBILES FOR THE PERIOD FROM JULY 1, 1944 TO JUNE 30, 1946

The department operates passenger cars of various makes. Costs are kept separate for each piece of equipment and include operating expenses (includes gasoline, oil, grease, alcohol and other supplies), servicing and repairing (includes tires and tubes, washing and polishing and repairs); fixed charges (includes storage, insurance depreciation) based on a life of four years.

All equipment is regularly inspected by the Property Control Division and is kept in service as long as it is economical to do so. Each piece of equipment is given a number.

The department operates survey cars on which costs are kept on the same basis as passenger cars. These survey cars, in general, have ¾ to 1½ ton chassis with special survey bodies designed by this department.

Below are shown the per mile cost of use of passenger cars and survey trucks for each year of the biennium.

1944-1945			1945-1946		
139 Passengers Cars	@	$.031 per mile	148 Passenger Cars	@	$.030 per mile
60 Survey Trucks	@	.113 per mile	59 Survey Trucks	@	.079 per mile

TABLE 11—STATE OWNED BUILDINGS AS OF JUNE 30, 1946

The department owns 80 buildings throughout the State. These buildings are used for office purposes, storage of equipment and repair shops. Costs of operation are kept for each building. The expenses of operating the buildings, as far as is possible is charged, in the case of garages against the equipment stored in the building, in the case of repair, shops, against the equipment repaired, and in the case of office buildings, against the overhead of the unit.

TABLE 12—LEASED AND RENTED BUILDINGS AS OF JUNE 30, 1946

The department leased 20 buildings, and rented 96 buildings throughout the State. These are used for office purposes, storage of equipment and for repair shops. The majority are used for storage of automotive equipment.

EXHIBIT A—MILEAGE OF IMPROVED ROADS ON THE STATE HIGHWAY SYSTEM, BY TOWNS AND BY TYPES AS OF JUNE 30, 1946

Town	Graded	Gravel	Stone Surface	Water-bound Macadam	Bituminous Macadam	Bituminous Concrete	Concrete	Brick	Total
Andover	.12	.16	....	5.12	.43	....	5.00	....	10.83
Ansonia	....	....	....	....	2.61	2.82	....	....	5.43
Ashford	.55	2.77	....	6.07	8.84	....	1.59	....	19.82
Avon	....	.44	....	10.08	4.17	....	4.06	....	18.75
Barkhamsted	.....	2.11	....	20.07	.15	.52	....	....	22.85
Beacon Falls	....	2.17	....	.07	....	2.71	2.02	....	6.97
Berlin	.65	.30	....	3.89	6.73	1.72	11.04	....	24.33
Bethany	....	....	....	3.25	4.83	....	4.05	....	12.13
Bethel	.32	.12	....	5.64	2.51	....	3.51	....	12.10
Bethlehem	....	....	....	8.72	1.81	....	....	....	10.53
Bloomfield	....	....	....	7.91	14.29	....	....	....	22.20
Bolton	.50	.05	....	5.89	1.42	....	3.91	....	11.77
Bozrah	1.02	.....	.....	6.60	2.15	....	.32	....	10.09
Branford	.43	.13	....	.88	.73	.17	13.20	....	15.54
Bridgeport	....	....	....	....	.88	1.53	1.12	....	3.53
Bridgewater	4.02	.23	....	6.48	....	....	....	....	10.73
Bristol	....	....	....	2.97	2.70	2.99	5.33	....	13.99
Brookfield	.67	.23	....	6.92	1.57	....	5.30	....	14.69
Brooklyn	....	2.24	....	6.30	7.25	.16	....	....	15.95
Burlington	....	....	....	4.60	5.17	....	....	....	9.77
Canaan	....	4.42	....	13.44	....	....	....	....	17.86
Canterbury	1.16	3.55	....	9.93	....	....	.10	....	14.74
Canton	....	3.65	....	4.63	3.58	....	5.05	....	16.91
Chaplin	....	....	....	.42	1.76	....	6.42	....	8.60
Cheshire	....	....	....	.75	....	5.85	11.15	....	17.75
Chester	....	....	....	8.94	1.43	....	.69	....	11.06
Clinton	....	....	....	9.13	....	....	2.42	....	11.55
Colchester	.34	.59	....	7.26	6.62	3.03	4.66	....	22.50
Colebrook	....	....	....	13.36	1.28	....	1.79	....	16.43
Columbia	.13	....	....	6.34	3.57	....	6.58	....	16.62
Cornwall	.42	1.00	....	22.48	....	....	3.07	....	26.97
Coventry	....	1.00	1.89	.63	9.37	....	.57	....	13.46

Cromwell	....	1.54	....	4.58	2.14	....	6.71	....	14.97
Danbury	....	.61	1.40	7.52	....	....	14.20	....	23.73
Darien	....	....	....	....	....	3.38	6.85	....	10.23
Derby	....	76	....	1.96	....	3.41	1.18	....	7.31
Durham	....	....	....	5.81	.95	....	8.52	....	15.28
Eastford	....	1.94	....	2.42	3.89	....	3.31	....	11.56
East Granby	.19	1.28	....	2.61	9.66	....	....	....	13.74
East Haddam	....	.01	....	19.44	1.92	....	....	....	21.37
East Hampton	.35	1.10	....	9.64	6.17	....	5.58	....	22.84
East Hartford	.12	....	....	1.46	.93	6.03	8.82	.03	17.39
East Haven	....	....	....	4.62	.04	....	6.30	....	10.96
East Lyme	....	1.40	....	6.23	1.14	.06	5.42	....	14.25
Easton	.32	3.85	....	3.38	8.70	.06	....	....	16.31
East Windsor	....	.68	....	8.85	2.80	4.12	2.06	....	18.51
Ellington	.19	1.06	....	8.62	5.89	....	....	....	15.76
Enfield	....	....	....	6.70	7.87	1.94	5.97	....	22.48
Essex	....	....	....	12.95	1.43	....	....	....	14.38
Fairfield	....	3.74	....	2.92	5.39	.92	12.87	....	25.84
Farmington	....	1.22	....	10.29	5.39	2.70	10.56	....	30.16
Franklin	.50	4.87	....	2.88	....	....	4.90	....	13.15
Glastonbury	....	.26	....	4.76	5.10	1.36	12.17	....	23.65
Goshen	....	....	....	16.00	....	....	....	....	16.00
Granby	....	.45	....	9.91	10.95	.07	....	....	21.38
Greenwich	....	....	....	....	.25	1.34	11.49	....	13.08
Griswold	....	....	....	10.19	3.14	....	3.70	....	17.03
Groton	.01	.04	....	4.99	6.33	.88	11.17	....	23.42
Guilford	....	....	....	14.57	4.33	....	5.86	....	24.76
Haddam	....	.01	....	9.78	....	....	9.11	....	18.90
Hamden	2.44	....	....	....	.04	3.64	11.64	....	17.76
Hampton	....	....	....	8.03	1.66	....	....	....	9.69
Hartford	....	....	....	....	.81	.65	3.30	....	4.76
Hartland	....	1.96	....	20.69	.06	....	....	....	22.71
Harwinton	1.87	2.77	....	11.61	.68	.97	2.83	....	20.73
Hebron	4.12	1.07	....	10.98	2.12	1.46	.23	....	19.98
Kent	.83	....	....	11.83	....	....	9.97	....	22.63
Killingly	.90	1.86	....	5.49	11.14	.36	5.60	....	25.35
Killingworth	....	.05	....	8.49	5.25	....	....	....	13.79
Lebanon	....	6.97	....	12.78	4.36	....	....	....	24.11
Ledyard	1.23	....	....	6.41	8.26	....	....	....	15.90

Town	Graded	Gravel	Stone Surface	Water-bound Macadam	Bitumi-nous Macadam	Bitumi-nous Concrete	Concrete	Brick	Total
Lisbon	....	2.15	....	5.86	.11	....	5.11	....	13.23
Litchfield	....	....	....	5.96	2.83	....	11.35	....	20.14
Lyme	.07	....	....	8.35	....	....	....	....	8.42
Madison	2.74	.80	....	8.16	4.07	....	5.88	....	21.65
Manchester	....	....	....	2.85	3.02	4.37	5.07	....	15.31
Mansfield	.77	9.97	....	4.51	7.16	....	6.56	....	28.97
Marlboro	....	.07	....	2.51	.39	2.94	4.89	....	10.80
Meriden	4.23	....	....	7.46	2.84	1.57	11.96	.04	28.10
Middlebury	2.96	3.68	....	.61	3.42	....	4.57	....	15.24
Middlefield	....	....	....	12.30	1.03	....	3.41	....	16.74
Middletown	....	.61	....	5.57	.73	2.51	8.04	....	17.46
Milford	.02	1.08	....	.22	1.62	.36	14.15	....	17.45
Monroe	....	....	....	8.44	1.73	....	4.43	....	14.60
Montville	....	....	1.29	12.03	....	.51	7.46	....	21.29
Morris	.15	.02	....	5.02	8.21	....	.38	....	13.78
Naugatuck	.44	.85	....	.35	5.35	2.19	1.26	....	10.44
New Britain	....	....	....	.57	1.99	1.50	2.30	....	6.36
New Canaan	....	....	....	3.07	2.66	2.21	8.06	....	16.00
New Fairfield	2.41	6.68	....	9.35	....	....	....	....	18.44
New Hartford	....	3.71	....	5.40	5.61	....	2.36	....	17.08
New Haven	....	....	....	....	.41	....	1.04	....	1.45
Newington	....	....	....	4.83	11.90	2.65	1.07	....	20.45
New London	....	....	....	4.43	.81	.25	3.70	....	9.19
New Milford	.34	1.48	....	7.80	....	....	20.77	....	30.39
Newtown	.72	.12	....	13.76	1.22	....	10.36	....	26.18
Norfolk	.07	....	1.42	12.24	.41	....	4.20	....	18.34
North Branford	....	....	....	7.60	3.22	....	8.93	....	19.75
North Canaan	....	2.88	2.17	2.32	.30	....	4.46	....	12.13
North Haven	1.26	.19	....	3.91	....	6.64	6.94	....	18.94
North Stonington	3.32	4.78	....	4.19	17.37	....	....	....	29.66
Norwalk	....	....	....	....	.16	1.83	16.16	....	18.15
Norwich	....	1.54	....	9.23	2.22	.32	2.46	....	15.77
Old Lyme	.02	4.11	....	4.31	3.05	....	4.27	....	15.76
Old Saybrook	....	.02	....	10.44	....	....	7.81	....	18.27
Orange	.69	.90	....	5.33	3.06	....	11.35	....	21.33

Oxford	....	.89	....	6.36	.50	....	5.86	....	13.61
Plainfield	....	4.16	....	5.50	.63	.01	8.28	....	18.58
Plainville	....	....	....	1.98	....	2.67	6.08	....	10.73
Plymouth	1.42	1.11	....	1.46	....	....	4.21	....	8.20
Pomfret	....	.01	....	10.54	12.67	....	....	....	23.22
Portland	....	1.64	....	4.73	3.64	1.93	4.36	....	16.30
Preston	....	....	....	11.05	10.95	....	....	....	22.00
Prospect	....	....	....	2.59	6.50	....	....	....	9.09
Putnam	....	2.33	....	5.61	1.32	1.82	7.45	....	18.53
Redding	2.28	1.25	....	13.33	4.98	....	.66	....	22.50
Ridgefield	....	3.98	....	3.65	2.82	....	14.24	....	24.69
Rocky Hill	....	....	....	14.29	4.21	....	4.79	....	23.29
Roxbury	3.25	.19	....	8.90	2.25	....	....	....	14.59
Salem	....	....	....	7.68	....	3.23	3.23	....	14.14
Salisbury	....	4.54	....	10.72	.62	....	10.35	....	26.23
Saybrook	....	....	....	7.66	3.82	....	....	....	11.48
Scotland	....	.90	....	5.52	....	....	....	....	6.42
Seymour	....	.59	....	4.73	1.99	3.85	2.85	.10	14.11
Sharon	....	5.06	....	14.53	7.71	....	1.49	....	28.79
Shelton	...	5.76	.76	2.80	4.35	.95	4.41	....	19.03
Sherman	....	....	1.29	10.40	4.47	....	....	....	16.16
Simsbury	....	.79	....	9.82	10.39	1.35	.26	....	22.61
Somers	....	2.01	....	7.82	8.24	.14	....	....	18.21
Southbury	.17	2.65	....	10.75	1.08	.25	5.37	....	20.27
Southington	....	.32	....	3.00	1.57	7.23	4.89	....	17.01
South Windsor	....	.34	....	4.59	4.82	....	4.90	....	14.65
Sprague	....	2.68	....	5.05	.21	....	....	....	7.94
Stafford	....	.02	....	19.49	5.13	....	....	....	24.64
Stamford	....	.28	....	....	....	....	20.69	....	20.97
Sterling	....	5.19	....	5.64	2.11	....	....	....	12.94
Stonington	.13	3.49	....	4.17	6.90	....	7.84	....	22.53
Stratford	.82	.46	....	1.71	7.32	1.45	11.81	....	23.57
Suffield	....	.19	....	4.00	12.06	3.94	7.54	....	27.73
Thomaston	....	.02	....	1.56	1.61	1.31	8.01	....	12.51
Thompson	.09	4.84	....	1.93	11.32	....	2.72	....	20.90
Tolland	....	.05	....	15.71	.50		.43	....	16.69
Torrington	.23	5.95	3.96	3.25	.54	1.84	9.10	....	24.87
Trumbull	....	1.86	....	3.23	1.00	.19	17.17	....	23.45
Union	....	.96	....	6.90	....	....	5.83	....	13.69

Town	Graded	Gravel	Stone Surface	Water-bound Macadam	Bitumi-nous Macadam	Bitumi-nous Concrete	Concrete	Brick	Total
Vernon	....	....	....	4.68	.50	....	7.64	....	12.82
Voluntown	....	1.95	....	11.54	5.00	....	....	....	18.49
Wallingford	1.86	.06	....	2.92	1.07	2.71	4.94	....	13.56
Warren	.09	....	....	12.08	....	....	....	....	12.17
Washington	.74	.30	....	9.34	....	....	6.22	....	16.60
Waterbury	....	.82	....	....	3.10	1.68	11.66	....	17.26
Waterford	....	....	....	6.60	1.71	1.96	15.05	....	25.32
Watertown	.36	....	....	.64	6.34	1.73	6.69	....	15.76
Westbrook	.90	....	....	8.67	....	....	3.84	....	13.41
West Hartford	....	....	....	.42	5.34	1.60	10.28	....	17.64
West Haven	....	....	....	.82	7.19	.09	8.15	....	16.25
Weston	.37	.58	....	10.94	....	....	....	....	11.89
Westport	....	....	....	.67	4.78	1.03	17.27	....	23.75
Wethersfield	....	.02	....	6.77	6.35	1.63	5.80	....	20.57
Willington	.16	.10	....	10.37	2.67	....	6.23	....	19.53
Wilton	.09	5.48	....	7.21	1.30	....	7.72	....	21.80
Winchester	....	....	1.42	8.99	1.03	....	5.58	....	17.02
Windham	.56	6.66	....	3.12	....	....	7.98	....	18.32
Windsor	....	1.69	....	3.90	4.94	.20	7.60	....	18.33
Windsor Locks	....	.03	....	1.90	6.90	.77	1.55	....	11.15
Wolcott	....	.66	....	2.84	5.41	....	.97	....	9.88
Woodbridge	....	1.79	.39	9.58	3.27	....	6.74	....	21.77
Woodbury	1.18	....	1.27	11.86	3.52	....	3.31	....	21.14
Woodstock	....	1.29	....	21.22	1.83	....	....	....	24.34
Totals	58.31	196.24	17.26	1116.87	542.02	130.26	834.07	.17	2895.20

EXHIBIT B—THIS TABLE SHOWS THE STATUS OF THE TOWNS WITH REGARD TO STATE AID AND TOWN AID AS OF JUNE 30, 1946

Town	STATE AID					Town Aid Available for Use	
	Available for Agreement	Unliquidated Anticipated	Unliquiated Unfinished Sections	Under Contract	Under Agreement	Sec. 302g Sec. 512-C	Sec. 190-F
Andover	.....	.....	.....	.....	$19,820.54	$977.57	$7,016.00
Ansonia	.....	.....	.....	.....	.....	13,103.40	4,616.00
Ashford	.....	.....	.....	$9,480.07	.....	–14,482.99	13,137.00
Avon	$36,606.47	.....	.....	.....	25,000.00	21,250.00	11,402.00
Barkhamsted	.....	.....	.....	4,563.93	.....	5,500.00	19,834.93
Beacon Falls	.....	.....	.....	56,000.00	15,757.79	1,939.45	.....
Berlin	69,591.30	.....	.....	.....	.....	–23,668.00	6,429.00
Bethany	.....	.....	.....	.....	14,531.67	–403.00	6,697.00
Bethel	29,689.37	.....	.....	10,000.00	.....	–21,168.00	13,342.45
Bethelehem	16,400.00	.....	.....	.....	.....	23,668.00	6,738.00
Bloomfield	6,400.38	.....	.....	.....	6,000.00	–22,168.00	5,749.00
Bolton	.....	$28,012.74	.....	.....	.....	31,750.00	4,993.00
Bozrah	.....	.....	.....	16,607.32	.....	1,744.00	2,318.00
Branford	.....	19,337.31	.....	.....	.....	–13,668.00	19,249.00
Bridgeport	6,410.27	.....	.....	.....	.....	–23,668.00	5,993.00
Bridgewater	.....	.....	.....	.....	29,321.07	–20,002.30	18,478.00
Bristol	.....	.....	.....	.....	.....	–23,609.44	3,615.00
Brookfield	.....	.....	.....	29,263.49	.....	15,325.94	7,202.00
Brooklyn	150.63	.....	.....	20,000.00	.....	–18,630.34	4,637.00
Burlington	.....	.....	.....	18,227.41	.....	–8,775.56	.02
Canaan	.....	13,048.86	.....	.....	.....	38,467.77	4,513.00
Canterbury	.....	28,325.23	.....	.....	.....	–17,876.00	.....
Canton	.....	.....	.....	.....	15,292.97	.....	2,044.00
Chaplain	.....	.....	.....	24,800.00	.....	10,100.00	7,037.20
Cheshire	.....	.....	.....	33,065.88	.....	23,668.00	.....
Chester	5,476.65	.....	.....	.....	.....	250.00	9,853.00
Clinton	3,609.95	.....	.....	8,000.00	8,000.00	29,738.41	7,513.00
Colchester	.....	.....	.....	.....	25,677.33	–17,248.67	30,223.70
Colebrook	.....	.....	.....	.....	27,457.78	50,579.55	42,590.00
Columbia	.....	.....	.....	16,000.00	24,597.92	27,622.87	3,896.85
Cornwall	.....	.....	.....	.....	.....	–18,129.22	3,280.41
Coventry	29,952.49	.....	.....	.....	.....	–23,668.00	.....

Town	STATE AID				Town Aid Available for Use		
	Available for Agreement	Unliquidated Anticipated	Unliquiated Unfinished Sections	Under Contract	Under Agreement	Sec. 302g Sec. 512-C	Sec. 190-F
Cromwell	.....	.....	.....	.....	5,183.78	9,045.95	12,769.00
Danbury	.....	.....	.....	.....	.....	–23,668.00	30,426.86
Darien	6,659.29	.....	.....	.....	21,765.38	45,008.78	410.00
Derby	.....	.....	.....	.....	.....	–7,000.00	.....
Durham	.....	.....	.....	.....	16,400.00	.....	5,347.00
Eastford	.....	.....	.....	.....	22,401.00	48,033.06	15,445.00
East Granby	.....	.....	.....	.....	16,400.00	75,583.70	3,919.00
East Haddam	.....	.....	.....	12,347.95	.....	–11,813.01	64,463.90
East Hampton	.....	.....	.....	.....	17,539.17	.....	16,089.00
East Hartford	63,083.20	.....	.....	.....	.....	.....	4,390.00
East Haven	.....	.....	.....	64,777.20	.....	–14,000.00	21,359.00
East Lyme	54,464.35	.....	.....	.....	35,000.00	–17,668.00	165.45
Easton	.....	.....	.....	.....	449.62	–7,660.96	9,481.00
East Windsor	.....	$3,975.05	.....	.....	.....	–17,986.91	6,507.86
Ellington	16,814.32	.....	.....	10,000.00	.....	–17,446.52	11,882.25
Enfield	.....	.....	.....	.....	2,363.03	–14,136.69	28,728.00
Essex	1,648.77	.....	.....	.....	.....	6,000.00	196.00
Fairfield	.....	.....	.....	.....	.....	–23,668.00	16,087.00
Farmington	24,056.35	.....	.....	.....	.....	13,728.16	23,155.00
Franklin	.....	.....	.....	.....	6,015.20	49,670.00	6,986.00
Glastonbury	.....	.....	.....	16,661.85	.....	–10,000.00	21,194.10
Goshen	.....	.....	.....	.....	.....	37,178.24	52,932.00
Granby	.....	.....	.....	.....	.....	18,063.21	16,910.25
Greenwich	.....	.....	.....	.....	8,400.00	62,339.35	1,917.00
Griswold	51,149.93	.....	.....	.....	.....	–23,668.00	28,930.00
Groton	.....	.....	$1,398.42	.....	.....	.....	5,919.00
Guilford	.....	.....	.....	.....	17,023.63	.....	28,734.00
Haddam	.....	.....	.....	.....	22,444.85	–4,849.11	30,103.82
Hamden	.....	44,205.27	46,567.88	.....	.....	–23,668.00	8,458.36
Hampton	8,400.00	.....	.....	34,742.70	.....	–18,275.16	8,315.00
Hartford	.....	18,607.36	.....	.....	.....	–23,668.00	2,505.47
Hartland	2,742.68	.....	.....	.....	8,400.00	42,650.00	20,497.00
Harwinton	.....	37,689.90	.....	.....	.....	–17,254.66	.....
Hebron	.....	.....	.....	16,716.51	.....	18,421.57	1,686.00
Kent	.....	57,441.48	.....	.....	.....	–7,199.51	11,870.00

Town	STATE AID Available for Agreement	Unliquidated Anticipated	Unliquiated Unfinished Sections	Under Contract	Under Agreement	Town Aid Available for Use Sec. 302g Sec. 512-C	Sec. 190-F
Killingly	.....	.....	.....	.....	26,116.02	–23,668.00	65,182.00
Killingworth	.....	.....	.....	.....	19,721.26	33,493.09	48,378.00
Lebanon	.....	37,276.06	.....	.....	.....	34,293.23	39,393.65
Ledyard	.....	.....	.....	.....	7,400.00	40,489.08	22,448.00
Lisbon	.....	.....	.....	.....	41,486.84	335.86	.....
Litchfield	.....	.....	.....	.....	30,011.27	–23,668.00	60.414.30
Lyme	.....	.....	.....	.....	9,437.09	9,824.02	12,965.00
Madison	.....	.....	.....	.....	.....	11,425.24	6,708.00
Manchester	1,661.31	.....	.....	.....	.....	–23,668.00	9,337.00
Mansfield	53,460.84	.....	.....	8,000.00	.....	2,041.77	42,072.46
Marlborough	.....	.....	.....	.....	8,000.00	28,990.72	20,569.00
Meriden	.....	.....	.....	.....	.....	–18,168.00	7,449.00
Middlebury	6,253.01	.....	.....	.....	.....	–23,668.00	13,675.00
Middlefield	19,297.13	.....	.....	.....	.....	49,168.00	3,010.00
Middletown	.....	.....	.....	.....	26,335.50	–23,668.00	50,643.00
Milford	.....	.....	.....	16,182.24	.....	.....	16,840.00
Monroe	45,698.53	.....	.....	.....	.....	–11,324.50	8,408.00
Montville	.....	.....	.....	28,059.85	.....	20,668.00	33,247.55
Morris	.....	.....	.....	.....	.....	–23,668.00	567.96
Naugatuck	2,971.47	.....	.....	25,000.00	.....	–23,668.00	6,506.00
New Britain	16,822.26	.....	.....	.....	.....	.92	22,799.00
New Canaan	.....	.....	.....	.....	.....	17,750.00	8,672.00
New Fairfield	.....	.....	.....	8,000.00	39,098.86	–21,551.69	2,380.00
New Hartford	.....	.....	.....	.....	.....	–23,668.00	10,849.00
New Haven	.....	41,573.43	.....	.....	.....	–23,668.00	9,840.00
Newington	.....	.....	.....	.....	.....	36,332.00	14,801.00
New London	11,904.62	.....	.....	.....	.....	39.38	2,304.00
New Milford	25,086.44	.....	.....	.....	.....	–23,668.00	101,794.33
Newtown	.....	12,258.24	.....	.....	.....	34,791.20	.....
Norfolk	.....	19,837.11	.....	.....	.....	–23,668.00	.....
North Branford	.....	11,473.37	.....	.....	.....	–3,668.00	8,242.00
North Canaan	31,000.00	.....	.....	.....	20,258.61	1,834.16	4,873.00
North Haven	3,353.02	.....	.....	.....	.....	51,530.20	5,702.00
North Stonington	.....	73,513.04	.....	.....	.....	3,000.00	48,319.00
Norwalk	.....	73,513.04	.....	.....	.....	95,198.20	16,155.00

Town	STATE AID					Town Aid Available for Use	
	Available for Agreement	Unliquidated Anticipated	Unliquiated Unfinished Sections	Under Contract	Under Agreement	Sec. 302g Sec. 512-C	Sec. 190-F
Norwich	2,275.79	.....	.....	.....	.....	–23,668.00	11,864.00
Old Lyme	35,600.00	.....	.....	.....	4,000.00	.....	6,372.00
Old Saybrook	.....	.....	.....	.....	2,003.64	–23,668.00	9,844.00
Orange	.....	.....	.....	.....	.....	51,107.33	9,163.75
Oxford	.....	.....	.....	1,147.17	.....	–6,381.20	11,316.04
Plainfield	82,436.98	.....	.....	.....	.....	.....	5,404.00
Plainville	.....	.....	.....	5,484.93	.....	29,291.66	.....
Plymouth	54,704.99	.....	.....	30,000.00	.....	–16,168.00	.....
Pomfret	.....	.....	.....	.....	.....	.....	42,788.29
Portland	.....	.....	.....	.....	.....	2,166.59	22,603.00
Preston	.....	6,594.45	.....	.....	.....	–2,168.00	15,513.00
Prospect	.....	.....	.....	.....	.....	–23,668.00	.....
Putnam	.....	.....	.....	.....	33,220.03	47,000.00	17,930.00
Redding	.....	.....	54,014.83	.....	.....	–13,668.00	27,864.00
Ridgefield	.....	11,892.95	90,825.57	.....	.....	40,215.51	33,943.00
Rocky Hill	.....	.....	.....	.....	23,931.74	75,545.14	14,020.86
Roxbury	.....	.....	.....	.....	3,214.68	20,082.00	50,569.00
Salem	.....	.....	.....	26,044.40	5,285.40	31,742.68	15,441.00
Salisbury	.....	.....	37,372.86	.....	.....	–23,548.41	.....
Saybrook	8,446.42	.....	.....	.....	9,590.78	26,575.63	2,241.00
Scotland	.....	.....	.....	.....	3,612.49	33,533.57	8,430.00
Seymour	12,384.91	.....	.....	.....	.....	16,588.56	11,416.00
Sharon	.....	.....	.....	.....	31,217.90	56,015.65	28,438.06
Shelton	.....	.....	.....	.....	28,490.85	–23,668.00	5,908.00
Sherman	.....	.....	.....	15,403.71	.....	4,245.30	2,813.00
Simsbury	.....	.....	.....	.....	.....	–354.99	7,073.26
Somers	3,043.73	.....	.....	.....	42,000.00	1,900.26	8,037.00
Southbury	.....	.....	.....	.....	.....	36,274.80	53,944.00
Southington	20,138.91	.....	.....	.....	.....	–23,668.00	.....
South Windsor	.....	.....	.....	.....	60,770.95	.....	9,756.00
Sprague	.....	.....	.....	62,582.50	.....	–3,056.91	1,006.00
Stafford	4,003.06	.....	.....	300.00	.....	–22,592.23	73,826.00
Stamford	8,352.62	.....	.....	.....	49,954.41	35,500.00	12,781.00
Sterling	.....	.....	.....	.....	.....	–6,500.00	4,420.00
Stonington	12,576.84	.....	.....	.....	.....	–11,668.00	23,861.00

Town	STATE AID			Town Aid Available for Use			
	Available for Agreement	Unliquidated Anticipated	Unliquiated Unfinished Sections	Under Contract	Under Agreement	Sec. 302g Sec. 512-C	Sec. 190-F
Stratford	.....	.....	.....	13,468.45	24,425.69	–23,343.40	4,667.00
Suffield	31,310.32	.....	.....	.....	.....	1,770.84	22,387.00
Thomaston	2,748.53	.....	.....	23,230.29	.....	–17,173.29	2,429.85
Thompson	781.83	.....	.....	6,295.34	.....	–16,943.27	.....
Tolland	.....	5,638.57	.....	.....	.....	–1,596.70	67,367.00
Torrington	.....	.....	.....	.....	25,467.49	–23,668.00	28,703.00
Trumbull	.....	.....	.....	.....	39,586.48	–7,732.25	25,090.00
Union	.....	.....	.....	.....	.....	15,332.27	3,369.00
Vernon	51,297.41	.....	.....	.....	.....	8,000.00	11,849.00
Voluntown	.....	.....	.....	.....	24,800.00	13,179.20	5,116.00
Wallingford	.....	.....	.....	13,120.95	.....	13,280.24	32,575.20
Warren	.....	.....	.....	.....	29,150.89	–5,918.00	7,522.00
Washington	.....	.....	.....	.....	12,925.16	23,231.30	92,542.00
Waterbury	33,200.00	.....	.....	.....	.....	.....	9,228.00
Waterford	44,186.68	.....	.....	.....	.....	.....	3,812.00
Watertown	24.50	.....	.....	.....	.....	–23,668.00	30,530.15
Westbrook	.....	.....	.....	.....	.....	46,332.00	5,933.00
West Hartford	.....	.....	.....	.....	.....	–23,649.26	9,496.00
West Haven	.....	.....	22,253.65	.....	.....	–23,668.00	17,138.00
Weston	.....	.....	.....	.....	.....	23,668.00	20,349.00
Westport	.....	.....	90,439.95	.....	.....	–23,668.00	2,636.00
Wethersfield	.....	.....	.....	16,400.00	.....	–801.41	.....
Willington	.....	.....	.....	.....	31,400.00	21,418.00	55,239.00
Wilton	.....	.....	.....	.....	.....	10,092.00	8,396.00
Winchester	45,232.48	.....	.....	.....	.....	–23,668.00	32,721.00
Windham	.....	.....	.....	.....	49,710.40	21,604.46	13,156.00
Windsor	.....	.....	.....	.....	25,616.61	–23,650.94	4,279.45
Windsor Locks	.....	.....	.....	.....	.....	37,231.95	8,100.00
Wolcott	.....	.....	.....	713.37	.....	–23,489.65	.....
Woodbridge	20,054.28	.....	.....	.....	.....	62,729.10	17,400.00
Woodbury	.....	.....	.....	.....	36,139.91	–12,492.41	8,562.00
Woodstock	13,339.01	.....	.....	.....	.....	–11,781.53	55,309.00
Totals	$1,136,954.32	$470,700.42	$342,873.16	$700,687.51	$1,235,623.68	*$573,716.00	$2,669,209.04

*This figure represents the net amount available for use on the highway department's records as of June 30, 1946.

The plus balances amounting to $1,974,598.09 represents amounts allotted to towns but not to projects under construction. The minus balances represent allotments to projects prior to June 30, 1946 on allocations which become effective July 1, 1946 in accordance with Sec. 519-C of the cumulative supplement to the General Statutes.

EXHIBIT C—TOWN AID (SEC. 190-F)

AS OF JULY 1st, 1945

The allotment of money to each town under Section 190-F of the 1941 Supplement is shown below, with the mileage of unimproved roads upon which the division is based.

Town	*Allotment*	*Miles* Unimproved*
Andover	$1,576.00	5.1
Ansonia	1,082.00	3.5
Ashford	13,137.00	42.5
Avon	1,576.00	5.1
Barkhamsted	5,069.00	16.4
Beacon Falls	0.00	0.0
Berlin	6,429.00	20.8
Bethany	6,275.00	20.3
Bethel	2,936.00	9.5
Bethlehem	6,738.00	21.8
Bloomfield	5,749.00	18.6
Bolton	1,607.00	5.2
Bozrah	2,318.00	7.5
Branford	4,513.00	14.6
Bridgeport	1,855.00	6.0
Bridgewater	6,244.00	20.2
Bristol	587.00	1.9
Brookfield	7,202.00	23.3
Brooklyn	4,637.00	15.0
Burlington	3,956.00	12.8
Canaan	4,513.00	14.6
Canterbury	7,604.00	24.6
Canton	4,544.00	14.7
Chaplin	4,884.00	15.8
Cheshire	4,358.00	14.1
Chester	2,133.00	6.9
Clinton	1,515.00	4.9
Colchester	17,310.00	56.0
Colebrook	9,644.00	31.2
Columbia	1,236.00	4.0
Cornwall	9,366.00	30.3
Coventry	13,755.00	44.5
Cromwell	2,071.00	6.7
Danbury	9,675.00	31.3
Darien	62.00	0.2
Derby	464.00	1.5
Durham	5,347.00	17.3
Eastford	2,967.00	9.6
East Granby	587.00	1.9
East Haddam	24,326.00	78.7
East Hampton	9,953.00	32.2
East Hartford	958.00	3.1
East Haven	5,007.00	16.2
East Lyme	464.00	1.5
Easton	1,607.00	5.2
East Windsor	2,473.00	8.0
Ellington	11,313.00	36.6
Enfield	9,922.00	32.1
Essex	0.00	0.0
Fairfield	3,369.00	10.9
Farmington	3,987.00	12.9
Franklin	1,638.00	5.3
Glastonbury	7,758.00	25.1

Town	*Allotment*	*Miles* Unimproved*
Goshen	11,808.00	38.2
Granby	5,193.00	16.8
Greenwich	525.00	1.7
Griswold	5,224.00	16.9
Groton	1,051.00	3.4
Guilford	9,304.00	30.1
Haddam	8,191.00	26.5
Hamden	4,018.00	13.0
Hampton	8,315.00	26.9
Hartford	1,020.00	3.3
Hartland	3,215.00	10.4
Harwinton	8,098.00	26.2
Hebron	8,686.00	28.1
Kent	11,870.00	38.4
Killingly	14,466.00	46.8
Killingworth	9,922.00	32.1
Lebanon	19,597.00	63.4
Ledyard	7,758.00	25.1
Lisbon	216.00	0.7
Litchfield	25,563.00	82.7
Lyme	3,833.00	12.4
Madison	6,708.00	21.7
Manchester	2,071.00	6.7
Mansfield	15,084.00	48.8
Marlboro	4,729.00	15.3
Meriden	7,449.00	24.1
Middlebury	2,875.00	9.3
Middlefield	402.00	1.3
Middletown	16,939.00	54.8
Milford	3,462.00	11.2
Monroe	8,408.00	27.2
Montville	10,479.00	33.9
Morris	3,647.00	11.8
Naugatuck	1,360.00	4.4
New Britain	1,051.00	3.4
New Canaan	1,638.00	5.3
New Fairfield	2,380.00	7.7
New Hartford	10,849.00	35.1
New Haven	2,226.00	7.2
Newington	2,689.00	8.7
New London	340.00	1.1
New Milford	29,396.00	95.1
Newtown	33,970.00	109.9
Norfolk	5,007.00	16.2
North Branford	1,978.00	6.4
North Canaan	835.00	2.7
North Haven	958.00	3.1
North Stonington	10,571.00	34.2
Norwalk	3,493.00	11.3
Norwich	618.00	2.0
Old Lyme	618.00	2.0
Old Saybrook	1,144.00	3.7
Orange	4,049.00	13.1
Oxford	7,264.00	23.5
Plainfield	5,100.00	16.5
Plainville	1,607.00	5.2
Plymouth	2,473.00	8.0
Pomfret	10,448.00	33.8
Portland	4,235.00	13.7

Town	*Allotment*	*Miles* Unimproved*
Preston	4,575.00	14.8
Prospect	587.00	1.9
Putnam	4,204.00	13.6
Redding	5,780.00	18.7
Ridgefield	9,953.00	32.2
Rocky Hill	3,400.00	11.0
Roxbury	9,613.00	31.1
Salem	2,287.00	7.4
Salisbury	6,986.00	22.6
Saybrook	525.00	1.7
Scotland	2,164.00	7.0
Seymour	2,596.00	8.4
Sharon	9,180.00	29.7
Shelton	5,904.00	19.1
Sherman	2,813.00	9.1
Simsbury	4,760.00	15.4
Somers	8,037.00	26.0
Southbury	16,228.00	52.5
Southington	7,944.00	25.7
South Windsor	1,916.00	6.2
Sprague	1,484.00	4.8
Stafford	16,444.00	53.2
Stamford	2,071.00	6.7
Sterling	4,420.00	14.3
Stonington	4,297.00	13.9
Stratford	4,667.00	15.1
Suffield	7,697.00	24.9
Thomaston	2,349.00	7.6
Thompson	14,373.00	46.5
Tolland	14,837.00	48.0
Torrington	6,151.00	19.9
Trumbull	5,688.00	18.4
Union	3,369.00	10.9
Vernon	2,071.00	6.7
Voluntown	3,740.00	12.1
Wallingford	8,037.00	26.0
Warren	5,780.00	18.7
Washington	20,308.00	65.7
Waterbury	2,164.00	7.0
Waterford	618.00	2.0
Watertown	9,768.00	31.6
Westbrook	1,391.00	4.5
West Hartford	1,576.00	5.1
West Haven	4,018.00	13.0
Weston	4,049.00	13.1
Westport	618.00	2.0
Wethersfield	3,184.00	10.3
Willington	12,117.00	39.2
Wilton	2,844.00	9.2
Winchester	5,255.00	17.0
Windham	1,762.00	5.7
Windsor	3,276.00	10.6
Windsor Locks	2,318.00	7.5
Wolcott	5,007.00	16.2
Woodbridge	3,122.00	10.1
Woodbury	8,562.00	27.7
Woodstock	26,397.00	85.4
Totals	$1,000,000.00	3,235.2

EXHIBIT D—CONSTRUCTION PROJECTS COMPLETED IN THE BIENNIUM

Description	*Completed*
Ansonia—Sidewalks, Route 115	April 15, 1946
Ansonia—Bituminous Surface, Route 115	October 27, 1945
Ansonia—Eight Sections	January 1, 1946
Avon—Sidewalks, Avon Center	September 28, 1945
Barkhamsted—Route 181	May 15, 1946
Beacon Falls—Lasky Road	May 14, 1946
Bloomfield—Blue Hills Avenue	August 21, 1945
Bolton—Steels Crossing Road	October 14, 1944
Bozrah—Landhoff, Bogey Ledge & Wauwecus Hill Roads	June 15, 1946
Brookfield—Eight Sections	June 1, 1946
Brooklyn—Windham, Herme & Mason Hill Rds.	May 21, 1946
Burlington—Milford Street	September 13, 1945
Chaplin—Bujak Road	August 30, 1945
Columbia—Old Willimantic Road	June 27, 1945
Derby—Route 115	October 12, 1944
Durham—Blue Hills Road	June 28, 1946
East Granby—Floydville Rd. & Holcomb St.	August 25, 1945
East Hartford—Mercer Street	June 3, 1946
East Haven—Sidewalk & Bridge Rail—Farm River	September 18, 1944
East Windsor—Depot Road	January 17, 1946
East Windsor—Depot Road—Drainage	June 23, 1946
Enfield—Taylor Road	July 28, 1944
Fairfield—Stratfield Road	May 9, 1945
Glastonbury—Naubuc Avenue	September 8, 1945
Glastonbury—5 Sections	May 2, 1946
Granby—Silver Street—Retaining Wall	September 24, 1945
Groton—Route 84	October 13, 1945
Groton—Route 1A	October 13, 1945
Groton—Route 84	November 21, 1945
Hamden—Eramo Terrace	June 1, 1945
Hartford—Prospect Street Bridge	June 4, 1946
Hartford—Potter Street—Removal of Bldgs.	October 10, 1945
Hartford—Riverfront Blvd; Park River Express Highway	November 23, 1945
Hartford—Bushnell Park—Removal of Material	July 5, 1945
Hartland—Paper Mill & Arthur Hayne Roads	April 21, 1945
Lebanon—McGraw Road—Bridge over Yantic River	April 27, 1945
Madison—Fort Path and Opening Hill Rds.	June 27, 1945
Manchester—40 Streets—Surface Treatment	October 7, 1944
Middlebury—Route 188 & 63—Widening Bridges	January 2, 1945
Milford—Wolf Harbor Road	June 8, 1946
Monroe—Moose Hill Road	April 4, 1946
New Canaan—Smith Ridge Road	May 22, 1946
New Fairfield—Bear Mountain Road—Bridge	December 4, 1945
New Haven—Route U. S. #1—West River Bridge Repairs	December 6, 1944
New Haven—Tomlinson Bridge—Repairs	November 28, 1944
Newington—Willard Avenue—Sidewalk	September 2, 1944
North Haven—Route 5 and 5A Drainage	October 18, 1945
Norwalk—Rowayton Avenue	April 22, 1945
Old Saybrook—Hartland and Shore Drives and Old Town Beach	May 23, 1946
Orange—Oakwood, Fernbrook and Ridge Roads	November 9, 1944
Orange—Lambert Road	July 12, 1945
Plymouth—Route 6—Sidewalks	October 12, 1944
Portland—Main Street—Drainage	May 11, 1945
Rocky Hill—France Road	October 16, 1945
Simsbury—Wintonbury and Holcomb Roads	November 21, 1945
Simsbury—Holcomb Road	April 18, 1946
Somers—Bilton and Mountain View Roads	November 26, 1945
East Hartford—South Windsor—Route #5A—Drainage	April 21, 1945

Description	*Completed*
Stafford—Route 20 at Square Pond Brook—Channel	November 8, 1944
Stratford—Lordship Meadow Road	December 8, 1945
Thomaston—Walnut Tree Hill and Marine St.	June 21, 1946
Thompson—Route 12—Sidewalks	May 29, 1945
Thompson—Ravenelle Road	January 10, 1946
Union—Bigelow Hollow and Town Hall Roads	August 9, 1945
Union—Bigelow Hollow	April 27, 1946
Wallingford—Relocation Quinnipiac River—Wilbur Cross Parkway	June 12, 1945
Wallingford—Masonic Avenue—Wilbur Cross Parkway	June 19, 1946
Waterford—Broad Street Bridge	September 27, 1945
Watertown—Morris Town Line Road	May 3, 1946
Westport—Route #1—Bridge Repairs	May 17, 1946
Wilton—Chicken Street	September 22, 1944
Windsor Locks—South, First, Second and Birge Streets	December 10, 1945

EXHIBIT E--STATUS OF DESIGN WORK CLASSIFIED BY HIGHWAY SYSTEMS—JUNE 30, 1946

	Wilbur Cross Highway (Fed. Aid)	All Other Fed. Aid	Wilbur Cross Parkway	Trunk Line	State Aid	Town Aid	Total
Design Complete	$ 434,000	$ 1,451,000	$6,696,000	$ 809,000	$ 66,000	$1,489,000	$10,945,000
Design Complete Except for Property Acquisition	.....	.....	.....	108,000	9,000	278,000	395,000
Design Complete Except for Public Road Administration Approval	2,059,000	1,630,000	.....	.....	.....	.....	3,689,000
Design Incomplete	144,000	14,738,000	800,000	1,640,000	195,000	1,472,000	18,989,000
Percent Complete	88%	55%	74%	60%	50%	53%	56%
Design Not Started	.....	.....	.....	750,000	.....	543,000	1,293,000
Total	$2,637,000	$17,819,000	$7,496,000	$3,307,000	$270,000	$3,782,000	$35,311,000

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